The Medical Expert Witness—Positive—Negative—Maybe

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Commendable pioneering has been initiated in the controversial field of the law of evidence involving the now confusing status of the medical expert, insofar as personal injury litigation is concerned.

The pioneering, of which I speak, lies in the forward steps taken in urging that independent medical panels composed of recognized medical men examine plaintiffs and claimants in personal injury cases, with the ultimate aim of eliminating the usual conflict of expert opinion between the plaintiffs' and the defendants' side of a personal injury suit.

It is readily admitted that the medical panel idea is not a cure-all.

This is particularly true in the medical fields where medical experts themselves differ. In the controversial fields of medicine and surgery we cannot urge that the independent "unbiased" medical panel suggestion is the answer. In these fields, we still have to fall back upon the adversary techniques of direct and cross-examination of the experts expounding their particular theories concerning the medical problem at hand.

But, certainly, in considering the broad field of personal injury litigation, the controversial medical problem cases will be in the *low* minority when compared with the number of medical problem cases upon which there is general agreement among medical experts. It is believed that the "panel of independent medical experts" idea is basically directed to this general field of medicine where experts do find agreement—in this area, then, the panel theory certainly finds support.

By agreement of the parties where the panel suggestion is workable, trial time is reduced; juries get a clear-cut explanation of the injury with estimates of disability; and a tempering influence is exerted upon *all* testimony in the case, including that of the plaintiff and defendant concerning the nature and extent of the personal injury at issue. In this sense, real public service is given, plus a tremendous contribution to public good. At least, in giving serious consideration to the panel idea, both medicine and law are not "standing still" but are reaching out to achieve "more" justice for the public.

Until the "bugs" in the panel theory are eliminated or controlled, it is suggested that active steps be taken in our various states by lawyers and physicians seeking to standardize the kind of testimony acceptable as evidence in personal injury cases relative to testimony pertaining to the causal relationship of accident to injury.

The increase in the number of personal injury claims and law suits has naturally brought about the need for lawyers and doctors learning more about medical-legal problems. Lawyers have become "experts" in analyzing medical problems; and doctors have been required to learn the legal approach to matters of evidence and testimony as a result of examining and testifying in these personal injury cases.

The various courts in the United States have reached no single conclusion which can be pointed to as being "the law" on expert medical testimony relating to causal relationship between injury and accident.

The purpose of permitting medical experts to testify on causal relationship has always been to give aid to the jury in arriving at a verdict. The medical expert in testifying positively as to the relationship of injury and cause can be very helpful to the jury in serving the ends of justice.

In order that justice can actually be achieved in personal injury cases involving the relating of the injury to the accident, it would seem prudent to attempt to cut through the confusion which exists in the minds of doctors and lawyers concerning testimony about causal relationship.

At present, many courts permit medical men to not only testify on "probable" cause, but also permit testimony on

"what is possible" or "what might" or "what could" be the relationship between the injury and the accident. Thus, we find the use of the following words in cases involving the testimony of the medical expert—"likely," "could," "might," "possible" or "probable."

Since the courts of the various states have generally allowed great latitude in considering the testimony of medical experts, cases involving personal injuries are causing medical men and lawyers alike difficulty in trying to confine the expert testimony in this field to a level of some certainty as opposed to conjecture and speculation.

Since medicine and law are not exact sciences, there is a natural reluctance for both the doctor and lawyer to make categorical and positive statements concerning the direct causal relationship between claimed personal injuries and the accident. This reluctance makes for confusion; and sometimes leads to injustices as far as both plaintiff and defendant are concerned in personal injury actions.

It is submitted that most medical men do not appreciate or understand the distinction which should be drawn in testifying about "probable" cause as distinguished from "possible" cause. Most doctors use the two words interchangeably without thinking about the distinction between the words as far as the law is concerned.

At this point, the reader will appreciate certain definitions of the words under consideration.

The words "probable," "likely," and "liable" are synonymous when applied to the effects of a personal injury, each dealing with reasonable probability and not with possibility, and testimony concerning what may probably, or is likely or liable to be the future result of a personal injury, is competent evidence to prove what is reasonably certain the matter. See Hallum v. Village of Omro, 122 Wis. 337, 99 N. W. 1051, 1054.

Black's Law Dictionary (4th Edition) defines "probable" as: Having the appearance of truth; having the character of probability; appearing to be founded in reason or experience. State v. Thiele, 119 Iowa 659, 94 N. W. 256. Having more evidence for than against; supported by evidence which inclines the mind to believe, but leaves some room for doubt; likely. Barrett v. Green River & Rock Springs Live Stock

Co., 28 Wyo. 379, 205 Pac. 742, 743. Apparently true, yet possibly false. Spadra Creek Coal Co. v. Harger, 130 Ark. 374, 197 S. W. 705.

Bouvier's Law Dictionary (Baldwin's Century Edition) defines "probable" as: Having the appearance of truth; appearing to be founded in reason.

Things or results which are only possible cannot be spoken of as either "probable or natural," for the latter are those things or events which are likely to happen, and which, for that reason should be foreseen. Things which are possible may never happen, but those which are natural or probable are those which do happen, and happen with such frequency or regularity as to become a matter of definite inference. Scott v. Allegheny Valley Ry. Co., 172 Pa. 646, 33 Atl. 712, 713, citing South Side Pass. Ry. Co. v. Trich, 117 Pa. 390, 11 Atl. 627, 2 Am. St. Rep. 672.

Black's Law Dictionary (4th Edition) defines "possible" as: Capable of existing, happening, being, becoming or coming to pass; feasible, not contrary to nature of things; neither necessitated nor precluded; free to happen or not; contrasted with necessary and impossible. In another sense, the word denotes extreme improbability, without including the idea of feasibility. Norris v. Elmdale Elevator Co., 216 Mich. 548, 185 N. W. 696, 698; Miller v. Southern Express Co., 99 S. C. 333, 83 S. E. 449, 451.

The term "likely" means "probable" or "reasonably to be expected." Vohs v. Shorthill & Co., 130 Iowa 538, 107 N. W. 417, 419, citing Webster's International Dictionary; Century Dictionary.

The words "probably" and "likely" are used synonymously in indicating consequences likely to flow from an existing condition of an injured person. Barron v. Duke, 120 Ore. 181, 250 Pac. 628, 632.

The word "likely" is not synonymous with the word "probable" but has practically the same meaning in a question to a witness as to whether personal injuries are "likely" to be reduced or increased as the injured person grows older. Knoll v. Third Ave. R. Co., 46 App. Div. 527, 62 N. Y. Supp. 16, 19.

The word "likely" means "probable," and is equivalent to that word as used in a question to a physician, in an action

for personal injuries, as to what, in his opinion, would be the "probable" effects of the wound on the future health of the injured party. O'Brien v. New York, N. H. & H. R. Co., 59 Hun 623, 13 N. Y. Supp. 305.

The word "likely" is not equivalent to the words "reasonably certain." Robards v. Kansas City Public Service Co., 238 Mo. App. 165, 177 S.W.2d 709, 712.

The word "likely" when used as an adjective, means "of such nature or so circumstanced as to render something probable," and, as an adverb, the word means "in all probability," or "probably." Boland v. Vanderbilt, 140 Conn. 520, 102 A.2d 362, 365.

"Could" merely expresses "a contingency that may be possible" and nothing more (Webster's New International Dictionary, 2d Ed. (1934)). United States Casualty Co. v. Kelly, 78 Ga. App. 112, 50 S.E.2d 238, 240.

The past tense "could" has been held to denote ability and capability and is frequently used as meaning "might" (Nelson v. Boston & Montana Consol. Copper & Silver Min. Co., 35 Mont. 223, 88 Pac. 785, 786), although the latter rather implies "was possible," within the limits of chance, while "could" more strongly signifies "was able," "had the power" (Western R. Co. v. Young, 51 Ga. 489, 493).

"Might" is equivalent to "had power" or "was possible." Lewiston Milling Co., Ltd. v. Cardiff, 266 Fed. 753, 758.

The word "might" is the preterit of the word "may" and is equivalent to "had power" or "was possible," denoting not only a possibility but also ability and capability. Larson v. City of Seattle, 25 Wash.2d 291, 171 P.2d 212, 214.

Black's Law Dictionary (4th Edition) states: "Might is the preterit of the word 'may.' Equivalent to 'had power' or 'was possible' or 'have the physical or moral opportunity to be contingently possible.'" In re Weidberg's Estate, 172 Misc. 524, 15 N.Y.S.2d 252, 257.

A medical expert generally possesses a unique skill and knowledge which is used as a basis for his qualification as a medical expert witness. Upon proper qualification, the expert may express an expert opinion or opinions about certain facts or information given him or learned from personal contact. Thus, unless properly controlled by a definite rule of evidence

as to the qualifying word or words to be used in obtaining opinion evidence from a medical expert, the ends of justice might well be flaunted.

Likewise, the testimony of the expert should be given as an opinion and not as a conclusion as many would seem to think. Testimony by the expert in the form of a conclusion is just as objectionable as testimony which is tinged with speculation and conjecture. Testimony by the expert in the form of a conclusion invades the province of the jury, because the jury in the last analysis must decide questions of ultimate fact.

Considering the statements made above, it becomes apparent why doctors and lawyers become confused about what is proper or improper expert testimony from an evidentiary standpoint.

The objection to the use of such words as "possible," "could," or "might" is that these words tend toward encouraging conjecture or speculation on the part of the medical expert; and in turn, on the part of the jury.

The medical expert is trained and educated upon the premise that medicine is advancing rapidly in finding cures for physical ills; and he is, therefore, reluctant to answer a question calling for an opinion relative to a "possible" relationship, or whether there "could" or "might" be a relationship between the injury and the accident in the negative because his very training has taught him that anything in a medical sense is "possible," or "might" or "could" occur.

The use of questions calling for a so-called expert opinion from the expert deliberately using such words as "possible," "could" or "might" takes unfair advantage of the expert when he is on the witness stand under oath and testifying in a personal injury case concerning causal relationship. This is true because in many instances, a "yes" or "no" answer to such a question using the words "possible," "could" or "might" is demanded of the expert without opportunity for explanation. The expert is thus usually forced to answer the question affirmatively, either in the sense that "anything is possible" or because he has failed to understand the distinction between "possible" and "probable," "reasonable medical certainty" and conjecture and speculation.

It is believed and urged that medical testimony which is couched in terms of the "possibility" of a causal relationship between an accident and injury should be considered as insufficient to establish the causal relationship. It is submitted that before the causal relationship is established medical testimony be limited to testimony as to "probabilities"; and that testimony indicating conjectures or speculations on the part of medical experts be ruled out and held for naught in personal injury cases.

It is only when medical testimony is confined to opinions embracing a "probability" or "likelihood" of a causal relationship existing that essential justice is achieved from a medical standpoint in personal injury cases.

The strict limitation of medical testimony to "probabilities" makes it certain that a jury carefully consider the testimony before reaching the conclusion that a causal relationship has been established with reasonable medical certainty. Any other approach, such as permitting the use of words complained against here by experts, reduces medical testimony to the plane of guesswork and chance, thereby defeating justice insofar as the parties to a lawsuit are concerned. Certainly, it is not justice to predicate liability on testimony which amounts to indefinite speculation or conjecture.

At this point, it might be of interest to cite several cases which discuss the question raised by this paper.

In the case of Oklahoma Natural Gas Co. v. Kelly (Oct. 17, 1944) 194 Okla. 646, 153 P.2d 1010, 21 Automobile Cases 478, the Oklahoma Supreme Court held as follows on the testimony of an expert:

> Two chiropractors testified as expert witnesses for the plaintiff that the curvature of the spine, fast heart beat, low blood pressure and the pain of which she complained "could" have been caused by the impact, which was hard enough to push the standing car in which plaintiff was riding from 6 to 10 feet. Plaintiff's expert witnesses were not asked, and did not testify, whether, in their opinion, the injuries complained of were "probably" caused by the accident.
>
> Two medical doctors called as experts by the defendant testified that, in their opinion, the curvature of plain-

tiff's spine was permanent and congenital, and was caused either by infantile paralysis or by an improper posture during the growing period, and that it had existed for from 8 to 13 years. They testified that in their opinion it could not have been caused by the accident.

. . .

The defendant admits that if the evidence was sufficient to submit to the jury the question of whether the curvature of the spine was caused by the accident, the verdict was right and the judgment should be sustained. Its sole contention is that the evidence was not sufficient to submit that question to the jury, and that consequently the verdict is excessive and a new trial should be ordered. It says that if a qualified expert witness (and it admits that a chiropractor may be such a witness) had testified that "the curvature of the spine was either the result of the accident or probably resulted therefrom" it would have been proper to submit to the jury the question of whether the accident caused the curvature of the spine, but that since the experts testified only that the curvature "could" have been caused by the accident it was improper to submit the question to the jury, and that the verdict was based upon conjecture and speculation.

The plaintiff does not contend that it was not necessary that the cause and extent of the curvature of her spine be established by the testimony of skilled and professional persons. Her contention is that it was so established by the opinion testimony of the two chiropractors when considered in connection with the other evidence including that as to her condition before and after the accident.

While there is authority to the contrary, we are committed to the rule that opinion evidence, such as that given by the plaintiff's expert witnesses, that a certain cause "might," "could" or "possibly" did or would bring about a certain result is competent and may have some probative value. *Glen L. Wigton Motor Co. v. Phillips,* 163 Okla. 160, 21 P.2d 751, and authorities there cited. See also 20 Am. Jur. 733; L. R. A. 1915 A at page 1070; 22 C. J. 721, notes 60 and 61; 32 C. J. S. 366, notes 20 and 21. The value of such evidence is ordinarily for the trier of the facts. But where such evidence is not corroborated or supplemented by other evidence, and where the fact necessary to be established must be proved by

testimony of a qualified expert, such evidence, standing alone, is generally held to be insufficient to make out a *prima facie* case. 135 A. L. R. 516–529, annotation.

On the question of whether the accident "could" cause the curvature of the spine there was a disagreement between the chiropractors testifying for the plaintiff and the medical doctors testifying for the defendant, but it was for the jury to resolve the conflict and to give such weight to the testimony of each of the expert witnesses as it deemed proper. *Dalton v. Bilbo,* 126 Okla. 139, 258 P. 274; *Inter-Ocean Oil Co. v. Marshall,* 166 Okla. 118, 26 P.2d 399; 22 C. J. 738; 32 C. J. S. 378.

In the Ohio case of Brandt v. Mansfield Rapid Transit, Inc., 153 Ohio St. 429, 92 N.E.2d 1, the Ohio Supreme Court held as follows:

Her physician was asked to express his opinion whether there was a causal connection between the injuries and the menopause.

"A. I can't answer it yes or no, I don't know; it could happen, sure.

"(Counsel for defendant moved the answer be stricken.)

"Court: Do you have an opinion?

"Witness: Well, I have an opinion, yes.

"Q. What is that opinion?

"(To which counsel for defendant objected but the court overruled the same.)

"A. I think that this could happen, whether it happened or not I don't know, but it could happen.

"(Counsel for defendant moved the answer be stricken.)

"Court: It isn't a question whether it could happen, it is a question whether or not there is a causal condition (connection) between the condition of the woman and the accident he described.

"Witness: That is what I mean, this condition could follow that sort of thing if it involved enough emotional shock.

"Counsel for defendant moved the answer be stricken but the court overruled the same."

Thus, the physician first said, "I don't know," and then consistently said four times that it "could" happen. At

no time did he testify that there was a *probable* causal connection between the injury and the premature menopause, nor did he express an opinion that there was any causal connection. Nevertheless the trial court refused to withdraw this claim from the consideration of the jury.

Was it error for the court to permit the jury to consider this testimony and this claim?

The jury was required to base its verdict on *probability,* and obviously such a verdict could not be based on mere *possibility.* This court has so held in numerous cases. In the *per curiam* opinion in the case of *Pfister v. Industrial Commission,* 139 Ohio St. 399, 40 N.E.2d 671, it was said:

"Medical testimony was introduced to establish trauma and causal connection. However, such testimony was merely to the effect that claimant's condition could have been or possibly was the result of trauma. As heretofore held by this court, the proof must establish a *probability* and not a mere *possibility. Drakulich v. Industrial Commission,* 137 Ohio St. 82, 27 N.E.2d 932."

In the third paragraph of the syllabus in the *Drakulich* case, supra, this court held:

"Testimony that a person's death from cancer of the liver *could* have resulted from a previous injury to his back is insufficient to prove causal connection between such injury and death. The proof in such case must establish a probability, not a mere possibility of such causal connection."

In the syllabus in the case of *Drew v. Industrial Commission,* 136 Ohio St. 499, 26 N.E.2d 793, this court said in part that "evidence which shows only that the paralysis *could* have been the direct result of injury sustained in the fall is insufficient proof to warrant submission of the cause to the jury." And in his opinion in that case Williams, J., stated, "Proof of possibility is not sufficient to establish a fact; probability is necessary."

In the instant case the plaintiff's sole medical evidence as to premature menopause was merely speculative and conjectural and hence could not serve as the basis for a finding rising to the requisite dignity of a probability. The defendant's objections to this testimony and to the submission of this claim to the jury should have been sustained, and the refusal of the trial court so to do constituted prejudicial error.

In the case of Devine v. Southern Pac. Co., — Ore. —, 295 P.2d 201, the confusing status of opinion evidence is demonstrated by quoting from portions of the opinion, as follows:

> "Q. I asked, Doctor, as to whether you have an opinion as to the trauma described causing the injury to the left lung and whether the cancer in the left lung, in your opinion, was caused by the trauma? A. That's a very difficult question, but if I might start by just reviewing a little bit; for example, the patient was hospitalized in 1949, diagnosis of pneumonitis. Apparently he was in the hospital about four days, wasn't he?
>
> ". . .
>
> "I feel, with the findings that I have before me, that a diagnosis of bronchiogenic carcinoma was not made within four months after the injury, the man was never able to return to his regular job (he did return to work but had to stop because he just got so sick he couldn't work) that one has to definitely consider the possibility that trauma is the causative factor in this case. Have I answered that, your honor, to your satisfaction?
>
> "Q. (By Mr. Plummer) Then, Doctor, it is your opinion, based upon the history of this case, that the injury caused the cancer in Frank Devine? A. Yes, I would be willing to stand on that opinion after I have read the history of the case and the autopsy findings.
>
> ". . .
>
> "While the doctor's explanation of his answer to the hypothetical question would be insufficient to establish a causal relation, because a possibility only appears, nevertheless, without objection, he stated that in his opinion the injury received caused the diseased condition which resulted in Devine's death, and we are of the opinion that the positive statement of the fact of causation raises the quality of the evidence from possibility to probability. Note to 135 A.L.R. 541, and cases cited therein."

Further, the Missouri case of Dennison v. Whaley, — Mo. App. —, 285 S.W.2d 73, is interesting because of the court's comments as follows:

> Defendant's first point is that it was error for the court to admit the testimony of one Dr. M. E. Humphreys as to his opinion pertaining to the connection between the

> injuries and the casualty. It is claimed that his testimony was conjectural, questionable and speculative, based on a hypothetical question which did not include all the facts, and that the opinion was based on probabilities and possibilities and not an unqualified opinion. A hypothetical question was asked Dr. Humphreys as to whether or not under the facts hypothecated the conditions he found upon examination of the plaintiff were the result of the circumstances of the wreck in evidence, and the witness answered that such result was "possible" and "probable." He testified that there could have been other causes. At no time during the somewhat extended re-examination of Dr. Humphreys did the defendant object to the hypothetical question or subsequent questions related to it, nor to his answers thereto, nor was there any motion to strike the same. The defendant cross-examined the witness thereafter at considerable length. We cannot charge the court with error in receiving the evidence not objected to by the opposing party. Furthermore, we cannot say that Dr. Humphreys' answer to the hypothetical question was no substantial evidence whatever, in view of the other facts in evidence such as the admitted casualty and certain physical injuries both to the car and to plaintiff immediately observed at the place of accident by defendant and others. Meredith v. Terminal R. R. Ass'n, Mo. App., 257 S.W.2d 221; Hill v. St. Louis Public Service Co., 359 Mo. 220, 221 S.W.2d 130. The point is overruled. (Page 75)

Other cases which the reader might find interesting are:

Cooper v. Helmerich & Payne, Inc. (March 8, 1947) 162 Kan. 547, 178 P.2d 242.

Travelers Ins. Co. v. Johnston (May 18, 1942) 204 Ark. 307, 162 S.W.2d 480.

Coca Cola Bottling Works, Inc. v. Catron (March 15, 1946) 186 Md. 156, 46 A.2d 303.

Anderson v. Anderson (April 13, 1933) 188 Minn. 602, 248 N. W. 35.

Choctaw County v. Bateman (Nov. 5, 1952) 208 Okla. 16, 252 P.2d 465.

Reserve Life Ins. Co. v. Everett (Tex. Civ. App.) (Jan. 14, 1955) 275 S.W.2d 713.

State v. Evans (May 29, 1951) 136 W. Va. 1, 66 S.E.2d 545.

Holt v. State (June 4, 1947) 84 Okla. Cr. 283, 181 P.2d 573.

See also the interesting articles and annotations concerning this subject appearing in 135 A.L.R. at pp. 516–545 and 136 A.L.R. at pp. 965–1007.

To illustrate clearly the great latitude permitted experts testifying on the question of causal relationship, an analysis of the phrases used by the experts which have been held admissible in the various states is set out below:

Alabama—
"probable"

Delaware—
"could have been and probably was"

Massachusetts—
"adequate cause" or "may have been or with a certain probability was" or "could" or "might"

Pennsylvania—
"probable reason" or "injury and accident not too remote"

Rhode Island—
"probable cause"

Tennessee—
"probably made necessary"

Texas—
"would likely result" or "could" or "possibly caused by" or "calculated to have been caused by" or "would probably result in"

Vermont—
"might" or "could have"

West Virginia—
"probable cause" or "might have been caused"

California—
"could" and "probable"

Florida—
"might have"

Illinois—
"might have been" or "could have been" or "probable"

Iowa—
"might have been" or "might have caused" or "probable result"

Kentucky—
"could have been"

Maryland—
"could have caused" or "likely" or "in all probability"

Missouri—
"probably caused by" or "could" or "might" or "would"

Nebraska—
"could" or "might have been"

New Hampshire—
"could"

New York—
"could" or "might" or "likely" or "reasonable certainty"
Wisconsin—
"could" or "might" or "likely to"
Washington—
"might" or "could have" or "probable cause"

Summary

Lawyers and medical experts alike are urged to give serious thought to this confusing situation as it now exists in the law. Certainly, a "better" kind of justice would be achieved on behalf of both the plaintiff and defendant in personal injury cases if medical testimony could be limited to testimony as to a "probable" causal relationship, and rejecting testimony which concerns itself with a "possible" causal relationship, which definitely reduces such testimony to that of speculation and conjecture.

Cases should not be tried in part upon speculation or conjecture, but should be tried on the broad premise of "reasonable medical certainty" and "probable cause." Only by following this basic premise will our Courts render justice unto the parties seeking an adjudication of their differences arising as a result of an inability to agree upon the nature and extent of the personal injuries involved in the particular controversy before the court.

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Chemical Findings in Cases of Fatal Barbiturate Intoxications

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Introduction

Barbiturates cause more deaths by poisoning than any one other chemical agent, with the exception of carbon monoxide (1, 2). In urban areas in the United States, deaths from this cause range from 1 to 6 per thousand (3).

Although many clinical and chemical studies of barbiturate intoxication have been published (4–16), little information is available on the distribution of barbiturates throughout the body in cases of fatal intoxication.

Early studies of the distribution of barbiturates in biological material were done on animals, using colorimetric or gravimetric methods. Keeser and Keeser's (17) work suggested that barbiturates were concentrated in selective areas of the central nervous system. Subsequent investigations by other workers (18–21), failed to support this contention. Keeser's data on experimental animals included barbiturate levels in various tissues in addition to that in the brain. The first study of the distribution of barbiturates in man was published in 1925 (22). Recent investigators (10, 23, 24, 33) have extended these observations. Raventos (25), Maynert (26), and Maynert and Van Dyke (27) have written excellent reviews of the distribution and metabolic fate of the barbiturates, but give very little specific quantitative data.

Information on the distribution of barbiturates in human tissues has been obtained in the investigation of alleged barbiturate fatalities by the Cuyahoga County (Ohio) Coroner's Office. The results are the subject of this paper.

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Occasionally, in connection with a medicolegal investigation, a question of possible poisoning is raised subsequent to the initial investigation and after the body has been autopsied and interred. The only easily available biological material in such circumstances is the formalin-fixed tissues stored by the pathologist for microscopic studies. The literature does not record the detection of barbiturates in these formalin-fixed samples. Data will be presented to indicate this to be a practical source of material to determine the possibility of barbiturate poisoning.

Materials and Methods

Tissues and blood samples, obtained at autopsy from 53 cases investigated by the Cuyahoga County (Ohio) Coroner's Office, were obtained for chemical analysis. Whenever available, urine and gastric contents were also analyzed. The majority of the cases studied were persons who had died of barbiturate poisoning. A few represented deaths from other causes in which death had been preceded by the ingestion of therapeutic doses of barbiturates. The distribution of barbiturates in these cases is also reported.

Several jars containing the formalin-fixed tissues from cases studied previously were kept under moderate refrigeration for periods up to three years. At various intervals, tissue samples and the formalin were analyzed for their barbiturate content. The formalin solution used for fixative was the usual 10% formaldehyde which had first been adjusted to a pH of 8.0 with magnesium carbonate. On standing, these solutions gradually became and remained acidic. Thus, alkaline conditions, which might have caused hydrolysis of the barbiturates, were avoided.

All samples were analyzed, using a slight modification (28) of Goldbaum's (4) ultraviolet spectrophotometric technique. In addition to the ultraviolet spectrophotometric identification, melting points of isolated crystals, microcrystalline tests and chromatography were used to corroborate the identification of the drug in question.

Results

The quantitative analysis of the biological materials submitted from the many cases in which barbiturates were the primary cause of death are tabulated in Table I.

TABLE I

Post-mortem Distribution of Barbiturates

Case	Blood	Liver	Kidney	Spleen	Brain	Fat	Heart	Gastric Contents **	L/B
PHENOBARBITAL									
5723	13.0	25.2	17.3	15.5	9.9				1.9
5921		9.5	7.8	4.2	5.2				
5956	9.0	24.9	18.1	19.5	16.5	14.0			2.7
6058	6.8	36.6	17.4	16.4	11.0				5.4
6249		17.3	13.4	11.9	6.1				
6295	8.6	17.6	12.3	10.9	15.2				2.0
6326	10.3	8.8	8.1	4.4	7.6	4.7			0.9
6628		14.5	4.2	3.1	4.0	3.0			
6721	1.5	2.4	1.7	Neg.	Neg.				1.6
6780	9.5	27.6	19.8	17.6	15.8	12.1			2.9
7118	11.4	28.2	15.5	18.6	12.4	14.4			2.5
7347	5.7	13.2	7.6	6.0	5.5				2.3
7745	3.2	3.3	3.3	2.8	2.3				1.0
7989*	2.2	5.2	4.9	3.5	3.6	Neg.			2.4
8063	4.8	11.6	6.8	6.8	9.1	9.7		10	2.4
8877	4.8	13.7	7.5	9.2	3.8	11.5	7.6	23	2.8
9072	4.9	15.6	8.5	5.0	6.6	4.7			3.2
9101	6.1	9.4	7.2	6.4	6.8				1.5
9140	54.0	145.0	86.7	85.	83.3				2.7
9275	18.	33.	16.	17.2	17.0	15.5			1.8
9467	20.5	45.0	25.7		30.9	15.9	29.0	3650	2.2
UNIDENTIFIED BARBITURATES									
5574		8.8	Neg.	6.1	Neg.				
6691	3.3	9.4	4.3	2.9	6.0				
7325	1.2	0.5	0.5	0.1	0.2				
8288	4.2	9.7	3.8	4.3	1.7	9.6		193	
8586	3.6	9.0	6.2	4.8	3.0			3	
8590	2.8	12.8	5.2	4.4	2.8	6.0			
8712*	2.0	10.5	6.3	9.0	7.5			11	
PENTOBARBITAL									
6292	1.9	8.1	3.5	4.3					4.3
6413	3.7	14.0	7.5	6.3					3.8
7711	2.2	8.1	3.9		1.4				3.7
7839	1.5	2.7	1.3	1.4	1.5				1.8
8129	2.8	12.2	3.9	7.5	4.3			3	4.4
8300	8.9	30.8	20.4	15.0	11.2	6.6		800	3.5
8420	3.7	12.0	7.0	6.4	6.9			185	3.2
8932	2.0	4.6	1.9	1.6	2.3			750	2.3
8956	9.0	39.5	11.4	16.9	9.0				4.4
8992	3.4	21.2	6.4	5.6	5.8	5.3		120	6.2
9005	0.8	1.5	0.7		0.7				1.9
9267	8.2	40.	16.	20.5	30.	30.3		145	4.9
9402	5.0	43.5	15.6	18.4	10.5	13.5	16.2		8.7
8788	6.1	10.5	6.3	9.0	7.5				
SECONAL									
6100	1.4	3.1	2.8	1.7	1.8				2.2
6373	3.5	13.5	6.0	5.7					4.3
7365	1.5	17.5	4.4	16.0	3.7	5.4			11.6
7877*	1.3	3.2	1.8	1.6	0.6				2.5
9165	10.	24.	12.	4.2	10.9	11.2			2.4
AMYTAL									
7193	1.8	2.5	1.5	2.9	1.0	1.9			1.4
7561	8.7	59.0	14.8	28.0	15.0	13.0			6.8
7861	1.4	7.2	4.0	3.0	1.1				5.1
7964*	3.3	5.0	3.8	5.2	2.5				1.5
8120*	1.4	2.4	1.7	1.0	Neg.	Neg.			1.7
9135	3.2	6.0	4.0	4.4	4.3	2.6			1.9

All tissue values are mg./100gm. of tissue. Blood values are mg./100 ml. of blood.

* Represent cases where therapeutic amounts of barbiturates had been taken by the patients. Autopsy indicated the cause of death was not due to barbiturates but to various other causes.

** Number of milligrams found in stomach contents.

The precise time of ingestion of the drug or of death was rarely known. However, the known facts in each case made it safe to assume that in the majority of cases at least 8–10 hours intervened before the victim was found dead. During

TABLE II

Distribution of Barbiturates in Formalin Fixed Tissues

Case	Date	Brain	Liver	Spleen	Kidney	Blood	Formalin	Barbiturate
6058	Initial	11.0	36.6	16.4	17.7	6.8		Phenobarbital
	12 months	1.7	4.5	4.6	2.9		1.8	
6249	Initial	13.4	17.3	11.5	11.9			Phenobarbital
	8 months		4.2	5.4	3.4	2.3		
6373	Initial		13.5	5.7	6.0	3.5		Seconal
	7 months	4.1	5.8	1.9	5.8		1.5	
6413	Initial		14.0	6.3	7.5	3.7		Pentobarbital
	7 months		3.3		2.6		1.1	
6691	Initial	6.0	9.4	2.9	4.3	3.3	0.9	Unidentified
	3 months	1.9	2.6	1.0	2.4			
6780	Initial	15.8	27.6	17.6	19.8	9.5		Phenobarbital
	2 months	6.3	5.7	7.5	6.0		4.1	
7118	Initial	12.4	28.2	18.6	15.5	11.4		Phenobarbital
	3 months	4.5	3.4	5.9	3.2		1.2	
	26 months	0.9	3.6	2.1	2.8		1.6	
6326	Initial	7.6	8.8	4.4	8.1	10.3		Phenobarbital
	7 months	3.1	3.6	4.9	3.7		2.4	
	20 months	3.2	4.1	4.1	3.2		0.5	
	28 months	Neg.	2.4	4.9	3.0		1.8	
	36 months	Neg.	2.4		2.5		0.7	
7561	Initial	15.0	59.0	28.0	14.8	8.7	8.7	Amytal
	22 months	3.2	22.0	19.5	9.7			
7711	Initial	1.4	8.1		3.9	2.2		Pentobarbital
	20 months	Neg.	4.7	3.8	1.3		1.0	
7193	Initial	1.0	2.5	2.9	1.5	1.8		Amytal
	26 months	Neg.	+	+	+		0.8	

TABLE III

Barbiturate Concentration of Formalin Used as Tissue Fixative

Case No.	Barbiturate	Time * (months)	Liver ** Mg./100 gm.	Formalin mg./100 ml.
7839	Pentobarbital	20	2.7	0.6
7861	Amobarbital	20	7.2	0.8
7877	Secobarbital	20	3.2	0.8
7989	Phenobarbital	18	5.2	0.6
8129	Pentobarbital	16	12.2	2.5
8288	Unidentified	14	9.7	1.4
8300	Pentobarbital	14	30.8	3.9
3586	Unidentified	13	9.0	0.8
8877	Phenobarbital	12	13.7	1.2
8932	Pentobarbital	12	4.6	1.1
8956	Pentobarbital	11	39.5	13.2
8992	Pentobarbital	11	21.2	0.7

* Represents the time between the original analysis and the formalin analysis.
** Barbiturate concentration of fresh tissue after autopsy.

this period, equilibration of the drug throughout the body probably occurred. The liver-blood barbiturate concentration ratio (L/B in Table I) was calculated as a measure of the equilibration of the drug between these two substances.

One therapeutic measure, almost universally advocated in the therapy of poisons taken by mouth, is the removal of the unabsorbed drug, usually by gastric lavage. Whenever gastric contents were available, they were analyzed. The resulting data (Gastric Contents column in Table I) should help evaluate the potential value of lavage therapy.

The formalin-fixed tissues obtained from fatal barbiturate cases were analyzed after different time intervals. These subsequent analyses are compared with the respective original determinations in Table II. In 12 other cases, only the formalin was analyzed. Table III presents data that indicate this liquid contained barbiturates for long periods after the tissues were put in for fixation.

Discussion

It is generally agreed that unless special precautions are taken, the ultraviolet spectrophotometric techniques for barbiturate analysis are not specific. Both the original barbiturate and its major metabolites will have similar ultraviolet absorption curves. Consequently, objections have been raised to the validity of any interpretation of the resulting analytical data obtained in this way (26, 27).

Several investigators (7, 11, 29) have shown there is a good correlation between a patient's clinical condition and his blood barbiturate level as measured by ultraviolet spectrophotometric analysis. Based on these findings, even if ratio of the metabolites to the original barbiturate is not known, one may interpret the ultraviolet spectrophotometric results. Another reason for accepting ultraviolet spectrophotometric data is the observation by Maynert (26) that the metabolites are more water soluble and more polar than the parent compound. They are, therefore, excreted more rapidly than the original barbiturate and do not tend to accumulate in the tissues or the body fluids.

In a medicolegal investigation, one is concerned with demonstrating the amount of a specific chemical agent present in

biological material. There is no question that the ultraviolet spectrophotometric methods will demonstrate the presence of malonyl-urea derivatives. Various confirmatory tests may be used to identify the specific barbiturate involved.

The distribution of barbiturates in various tissues is of obvious pharmacologic interest. Knowledge of the metabolism of a drug helps to understand its mechanism of action. For this reason, it would be extremely desirable to use a more precise technique to distinguish between a metabolite and the original barbiturate. Isolation and identification of these metabolites would also be significant. Work on this facet of the problem is just beginning in this laboratory.

The post-mortem blood barbiturate levels found in the fatal cases of poisoning were frequently lower than those found in patients who survived acute barbiturate intoxication. A fatal blood barbiturate level is obviously difficult to define. The chances for survival are not good if a patient has a blood barbiturate level higher than 12 mg. % in the case of long-acting barbiturates, 8 mg. % in the case of intermediate-acting, and 3–4 mg. % for the short-acting barbiturates. The contention of Fisher (30) and Broughton (24) that a barbiturate blood level in the above range does not allow one to assume that death was due to barbiturate poisoning is an important and valid one. Only when a complete autopsy is performed and the chemical and pathological findings evaluated can one make the diagnosis of death due to barbiturates.

The distribution of barbiturates in the tissues is shown by the data in Table I.

The distribution of barbiturates in the bodies of persons who died of barbiturate poisoning does not differ significantly from its distribution after ingestion of therapeutic doses. The liver has the highest concentration, generally followed by the kidney, spleen and brain. The barbiturate concentration was lower in the blood than in all the tissues examined, except the brain. The barbiturate concentration in this organ was usually the same order of magnitude as that of the blood. These data are consistent with those already reported for both man and animals. No significant concentration of barbiturates occurred in the fat. Apparently, the lipophilic phenomenon reported

for ultra-short thio-barbiturates does not occur with the non-sulfur substituted barbiturates.

Wright (7) has presented data which indicates that the liver/blood barbiturate concentration ratio may be a function of the time elapsing between ingestion and clinical saturation. Wright explained this on the basis of high initial storage of the ingested barbiturate by the liver and gradual equilibration with the blood. His data showed some higher ratios for patients found dead allegedly soon after ingestion. However, there is considerable uncertainty about the length of the

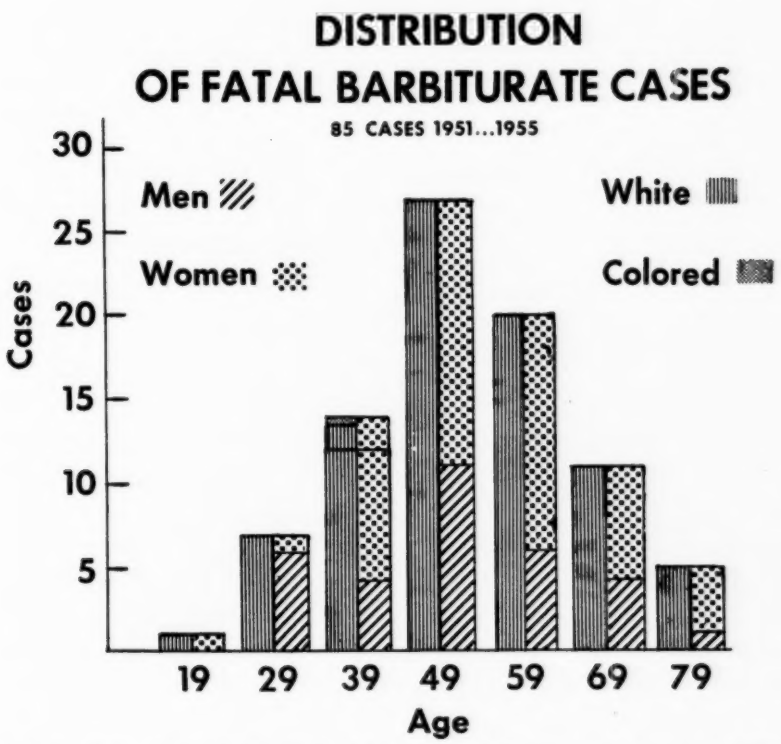

Fig. 1—Data on the distribution of 85 fatal barbiturate cases investigated by the Cuyahoga County (Ohio) Coroner's Office during 1951–1955. Each age category represents a 10-year-period ending with the given age, e. g. (10–19 years).

interval between death and examination of the tissues. Furthermore, the liver/blood ratios in Table I vary considerably in the case of each barbiturate, as well as between the various barbiturates. Since this ratio was not significantly constant, it may be that Wright's contention is valid. However, the amount of drug taken, the time it was ingested and the actual moment death occurred can rarely be determined precisely, since the only person who could ordinarily furnish these facts is the victim. Consequently, the liver/blood ratio could not be correlated with the time intervening between ingestion and death with any degree of confidence.

It is obvious from Figure 1 that fatal barbiturate poisoning in Cuyahoga County (Ohio) occurs predominantly in white people between the ages of 30–69 years. Twice as many women are implicated as men. These data agree with a more intensive study conducted over a one-year period (3).

The data in Table II and Table III are particularly significant to the medicolegal investigator. Should the question of barbiturate poisoning be raised subsequent to the original autopsy and after the body is interred, disinterment is not essential. The formalin-fixed tissues which are usually saved for indefinite periods, can be used. If significant amounts of barbiturates were originally present, it will be identifiable both in the tissues and in the formalin. The distribution of the drug in the tissues changes in a variable manner following formalin fixation. Fixation appears to remove the drug from the liver more quickly than from the other tissues. On the other hand, the spleen has a significantly higher barbiturate concentration than the other tissues after formalin fixation. Precise identification of the specific barbiturate becomes progressively more difficult as the post-mortem period is extended. However, identification of the presence of malonylurea derivatives in both the tissue and the formalin used to preserve the tissues after autopsy is practical, even as long as 3 years. Further data are needed to evaluate the significance of these findings.

Summary

Data are presented on the tissue distribution of barbiturates following fatal intoxication. Barbiturates tend to con-

centrate in the liver. The concentration of barbiturates in all other tissues, except the brain, is higher than the corresponding blood level. The brain barbiturate concentration is the same order of magnitude as that of the blood.

The blood barbiturate level is not a reliable index of fatal barbiturate intoxication. In 75% of the cases studied, the blood barbiturate levels were lower than those of many hospitalized patients who survived.

In the cases studied, twice as many fatalities occurred in women as in men. The incidence of fatal barbiturate intoxication in colored people is negligible.

Barbiturates, if originally present, may be detected in samples of formalin-fixed tissues for periods as long as 3 years after the original formalin-fixation. The formalin used for fixation also contains detectable amounts of barbiturates. Following formalin-fixation, the distribution of the barbiturates in the tissues changes and the highest concentration is usually found in the spleen.

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The Stepdaughter Paraphiliac Neurosis*

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During the last sixteen years an increase in the number of serious sexual attacks and sexual perversions has influenced the enactment of "sexual psychopath" laws by the legislatures of several states. California enacted its first sexual psychopath law in 1939. Unfortunately, there followed a flurry of legislation which was culminated in 1951 when Governor Warren vetoed a Bill proposing parole for those convicted of sexual offenses under Section 288 (California Penal Code) if they would voluntarily submit to castration, thus making castration the price for freedom. Governor Warren had the good judgment to recognize the need for consultation of experienced men in this field and, therefore, sought the advice of a board of eight psychiatrists. It recommended that he veto the Bill because the removal of the testes has no effect upon the urge to commit sexual acts, and a human being, as well as an animal, is capable of committing sexual acts even though his testes have been removed.

This paper is a study of six men who were convicted under Section 288 of the California Penal Code for having sexual relations with their minor stepdaughters and who were referred to psychiatrists for physical and mental examinations to determine whether or not they came within the meaning of "sexual psychopath" as defined under Section 5500 of the Welfare and Institutions Code, and, therefore, constituted a menace to the health and safety of others. Twenty other

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such cases have appeared in the files of the writer during the past three years. What is the justifiability, salutary effects, and futility of these codes?

Definition of Terms

Throughout this paper the term "neurosis" will refer to an emotional or mental disorder or illness which is characterized by certain mental or emotional symptoms and/or physical symptoms and which is caused or produced by the remote or recent environment. The patient always retains contact with reality and there are certain underlying psychopathological (emotional conflicts) mechanisms that may be discoverable.

A "paraphiliac neurotic" is a person who because of a neurosis is driven into acts of sexual perversion.

The term "psychopathic personality" refers to a person (1) who does not possess the ability to develop an adequate concept of time in relation to himself. This person lives for the moment and has no concern for the past or future. His behavior is regulated by the doctrine, "pleasure for the present."

Section 5500 of the Welfare and Institutions Code of California (3) defines "sexual psychopath" as follows: As used in this chapter "sexual psychopath" means any person who is affected, in a form predisposing to the commission of sexual offenses, and in a degree constituting him a menace to the health or safety of others, with any of the following conditions:

(a) Mental disease or disorder.
(b) Psychopathic personality.
(c) Marked departures from normal mentality.

Section 288 of the California Penal Code provides penalties for "Exciting Lust of Child Under Age of Fourteen. Any person who shall wilfully and lewdly commit any lewd or lascivious act (2) including any of the acts constituting other crimes provided for in part one of this code upon or with the body, or any part or member thereof, of a child under the age of fourteen years, with the intent of arousing, appealing to, or gratifying the lust or passions or sexual desires of such person or of such child, shall be guilty of a felony and

shall be imprisoned in the State Prison (2) for a term of from one year to life. Part one embodies the definition of each substantive crime in California and the penalty for its violation."

The following are six case examples that come under the California legal definition of sexual psychopath, but that were diagnosed by the writer as paraphiliac neurosis:

Cases

Case One. A 31-year-old male advised that in February of 1952, he was arrested upon a charge brought by his wife accusing him of having had sexual relations with his nine-year-old stepdaughter. He denied any knowledge of this but states that he was tried and received a sentence and then probation. Psychiatric examination was made in order to determine whether he suffered from a psychiatric abnormality and what treatment should be carried out.

The patient stated that he was getting along well until February of 1952, at which time his wife had accused him of having intercourse with his nine-year-old stepdaughter. He stated that later the charge was reduced to contributing to the delinquency of a minor.

He remained in the Los Angeles County Jail from February 26 until July 23, 1952, and his trial was held on June 12, 1952. He was sentenced to 90 days at road camp, served 60 days and had the remainder dismissed because of good behavior. While he was in road camp his wife obtained a divorce.

With regard to the allegations made by her he stated that he did not have relations with the stepdaughter; in fact, he stated he had had no sexual relations with her at any time. He said that he had played games with her and had pinched her, but that he never had any sexual thought in mind and never carried out any sexual act. He never derived sexual pleasure or stimulation in any way from playing with the child, he added, and all of his play with her was innocent.

Concerning his own sexual history he related that his sexual relations began when he was fifteen, that he had numerous experiences with various girls. His relations with his wife were not very satisfactory, as she was always "quite cold." Autoeroticism took place when he was a young man, but he denied any sexual abnormalities or perversions. A later history indicated that he had had the sexual relations charged by the child.

Case Two. The defendant was charged with violation of Section 288, Penal Code, in Counts 1 and 2, and rape in Counts 3 and 4. The defendant pleaded not guilty, was tried and found guilty of Counts 1 and 2.

A psychiatric examination was made in order to determine whether or not he was a sexual psychopath and whether or not he was a menace to the health and safety of others.

Specifically, a 43-year-old man was charged with having had sexual intercourse with his 10½-year-old stepdaughter on two occasions. He denied that he committed these acts but was found guilty as charged.

He had been married three times. He was first married at age 19 and was divorced at age 29. He remarried at age 31 and was divorced at age 35 or 36. There were no children by either of these marriages. He lived with his present wife for 4½ years after their marriage in March of 1951. She was 29 years of age and was in good health. His wife had a daughter by a previous marriage. This is the 10½-year-old girl with whom he is alleged to have had sexual intercourse. His wife also had two sons, 12 and 6 years of age, by a previous marriage. He had two children by his present wife, one 24 months of age and one 10 months of age and his wife was again pregnant. He stated he and his wife have always gotten along well together and there had been no problems between them. He stated their sexual relations were always quite satisfactory.

His only previous arrests had occurred because of two minor traffic violations. He denied that he ever had sexual relations with any child including the one in question. He also denied homosexual activities or tendencies and denied any other type of sexual perversion or abnormality.

He stated that he had not done anything but that his wife had accused him of "going with" (having sexual intercourse with) his 10½-year-old stepdaughter. He emphatically denied that he carried out this act. He stated that the stepdaughter told the judge it had happened on two successive days. The acts occurred at home while his wife was working. He stated with regard to the recent episode that he had just come in from work about 15 minutes before 5:00 p.m. and his wife came home at 5:00 p.m.

He was unable to state why the girl accused him except that her mother scolded her and said that if she did not tell her the truth she was going to kill her. He did not know why his wife suspected him. With regard to the episode, he stated that the stepdaughter told the jury that "I took her out of the chair and put her in the bed and put a gun on her." He denied that he threatened her with a gun and he stated that he never owned a gun and did not have a gun.

Assuming this defendant's guilt in this matter, he can be construed to be a sexual psychopath as defined under Section 5504 of the Welfare and Institutions Code. Having committed intercourse on two occasions with his stepdaughter, these occasions being one year apart, his offense can be said to be repetitive. As a sexual psychopath of this nature he is a menace to the health and safety of others. His specific deviation from normal personality or mentality can be said to be in the area of defective insight and judgment. With his present attitude of denial of the offense it seems somewhat doubtful that treatment will be of benefit. He was considered to be a case of paraphiliac neurosis.

Case Three. The defendant, thirty-seven years of age, was charged with rape on counts 1 and 3 and with violation of Section 288 of the Penal Code in counts 2 and 4. He pleaded not guilty, then changed his plea to guilty of count 1. A psychiatric examination was made in order to determine whether or not he was a sexual psychopath and a menace to the health and safety of others.

Specifically, he was charged with having had an act of sexual intercourse with his 13-year-old stepdaughter on New Year's Eve of 1952. He had sexual intercourse with her on two other occasions in 1953. The girl became pregnant and had a child.

He began autoeroticism with masturbation at the age of 19. He stated he had one episode of sexual intercourse prior to his marriage. He was first married at 19 and separated after five years of marriage. He had three children by this marriage. The children were 13, 12, and 11 years of age. He then began living with his present "common-law" wife and had lived with her for a period of eight years. They had three boys, ages 6 years, 4 years, and 4 months.

The patient stated that he always got along well with his wife. He stated they had sexual intercourse about two or three times a week and that this was satisfactory to both. There had been no abnormal sexual behavior or tendency toward homosexual activity or other sexual abnormality. On January 20, 1938, he was arrested on suspicion of burglary, but was released.

The defendant recalled having served some 30 days in the City Jail for the theft of blankets. He believed that this offense occurred around 1938 and it may refer to the offense cited above. On February 27, 1943, he was arrested for failure to provide and was released on bond on March 2, 1943.

The defendant stated that he got into trouble with a girl "who was too young." He stated she was 13 years of age although the probation officer's report stated that she was 14 years of age. She was the daughter of his common-law wife. They were both present at a New Year's Eve party in 1952. He stated he had been drinking heavily and they went outside. They embraced and he stated that she encouraged him and he had sexual intercourse with her on the lounge couch on the lawn. He stated that she was quite willing. This had never happened before but he stated that on two other occasions in 1953 he had acts of sexual intercourse with her. She became pregnant and subsequently gave birth to a boy. He stated that when her pregnancy was discovered due to her enlarging abdomen she finally admitted he was the father of the child. He was charged with statutory rape on October 27, 1953. He remained in jail for one month and then was released on bail.

The patient's judgment was found to be quite defective. With regard to his sexual behavior with the girl, he stated when he embraced her she returned his affection. On two occasions when he had sexual intercourse with her he had not been drinking. When asked why he

repeated his act, he said he knew it was wrong. He stated he preferred her to her mother and that she was more attractive and was more passionate. She seemed to enjoy it. He used no contraceptive. With regard to the question whether he did not fear she might become pregnant he said, "I didn't think about it. It was way out on the ranch. I figured she wouldn't get caught."

The patient stated that he knew his behavior was wrong and he manifested a degree of guilt feeling, but he continued, "she had menstruated and all that" and seemed to indicate that this condoned to an extent his behavior.

Due to his defective intellectual reactions, it was believed that this defendant was a borderline mental defective or of high grade moron level. Because of this mental deficiency it was believed that he manifested the poor judgment which led to his actual relations with the minor child.

As such, he suffered with a mental disorder which predisposed him to the commission of sexual acts that were harmful to the health and safety of others. It was therefore recommended that he be committed for treatment.

Case Four. The patient, twenty-six years of age stated that he remarried two years previously and that his wife had three children by a former marriage. The oldest of these was a daughter, 13 years of age, and he stated that he became attached to her and because of the situation that existed in the home he made a sexual approach to her.

He and his wife worked. He worked the graveyard shift and she worked the swing shift.

Because of this he was left alone much of the time with the children, including the 13-year-old daughter. He had the normal love of a father for her but gradually he began to develop an additional feeling towards her. He added that she was quite physically mature.

Beginning about 6 or 8 months before, he began to talk to her about intimate things and also began to caress her. He stated that he would kiss her and pet her and he gradually noted that his feeling was different from that of a father but had a romantic element in it. He stated that he then began to fondle her breasts. She seemed to offer no objection to any of this and little episodes continued intermittently.

The situation came to a climax when he developed a strong sexual feeling toward his stepdaughter. He stated that he was "frustrated over her."

On March 1, 1954, he attempted to have sexual intercourse with her in the garage. He continued that she complained and he didn't want to force her and he then desisted from having any sexual relations with her. He stated that he did not accomplish any sexual act but that he then had her fondle his penis while he achieved an orgasm.

Because of his affection for his stepdaughter he grew more moody and grouchy around the house.

She told her mother what had happened and the three of them talked it over and the husband was given a chance to straighten himself out.

However, he grew grouchy again and one night when the 13-year-old girl stayed out late he started to spank her with a belt. Later he believed that this was a way of "getting even" with her for having told her mother about his intimacy with her. When he started to spank her she climbed out a window and phoned her mother. He was then arrested and placed in jail on the 9th of March and remained there until April 13, 1954.

He was arrested only on one occasion, in August of 1951, for non-support of his first two children. His sexual relations with his second wife were not as satisfactory as they were with his first wife. He could not give any account or reason for this. Although he had no respect for his first wife, he did have great respect for his second wife. They had sexual intercourse about twice a week during which she reached a climax but the relations for some reason were unsatisfactory to him. General knowledge and intelligence were good. Insight was good and judgment was fair except for the events with regard to his reactions with this child.

With regard to insight he said, "I don't know whether I can rid my mind of the thought." He indicated that he still felt an urge toward this girl and believed he needed treatment for this in order to overcome it.

It is not believed that this patient is a sexual psychopath according to the definition under Section 5504 of the Welfare and Institutions Code. He is not a menace to the health and safety of others. His act was not repetitious and he had not engaged in this act with other children. The situational features are such that the situation can be attributed to an existing psychoneurosis.

Case Five. The defendant, thirty-three years of age, was charged with two counts of violation of Section 288 of the Penal Code with two prior felony convictions. He pleaded not guilty by reason of insanity. When the case was called for trial, the defendant changed his plea to guilty to count one and the court found the defendant sane at the time of offense and sane at the time of trial.

Specifically, it was charged that he placed his penis between the legs of his stepdaughter, age fourteen, and that he carried out this activity over a period of four or five months and that the episode charged occurred at least three or four times.

He was married at age 20 and divorced at age 22. He remarried at age 28. He had three stepchildren and a boy of his own, 3 years of age.

He had intercourse with his wife about twice a week. He states his relations with her were satisfactory, but that they were not frequent enough for him. He denied homosexual relations or other evidence of psychopathic sexual tendencies.

The patient stated that he frequently obtained what he described in his own words as "drastic urges" or "passionate urges." He stated, "I feel like I got to do something right now." When asked to explain this, he described a desire to have intercourse or "something like that."

His recent difficulty was with a young girl, his stepdaughter, age fourteen. He related, "I put my private parts between her legs three or four months ago. This was in September." The episode occurred, however, a number of times over a period of four or five months. He described further, "Even while driving a truck I will have these drastic urges—I can't seem to find words to explain it. I think any of us are ashamed of things like that and put it off—I'd just as soon cut it off if it would solve my problem."

The patient added that his wife was anemic and continued, "You know how women are that are not well. She is 32 and is in bad health."

With regard to his relations with his stepdaughter, he described placing his penis between her legs but not entering her vagina. He continues that "I would come between her legs." He does not know how many times this occurred but states that it was several times, perhaps four or five over a period of four or five months.

With regard to his arrest, he believed the girl told her mother. It had never entered his mind that she might become pregnant or that he might harm her in any way. He became tearful and depressed and at times said, "It's not right—I want to make it right." He stated he feels extremely guilty over his actions and that he wanted to go "to a hospital or even to spend years in prison if it is necessary."

He was arrested for burglary in 1941 and served eighteen months in San Quentin penitentiary. He was arrested for grand theft in 1952 and served twenty week ends in the Los Angeles County Jail. He had one arrest for operating trucks without a permit and was fined twenty-five dollars.

It was the examiner's opinion that this patient suffered with a paraphiliac neurosis, and that as such he was a menace to the health and safety of others. It was believed also that he conformed to the definition of a sexual psychopath as defined under Section 5504 of the Welfare and Institutions Code of the State of California. As such it was recommended that he be committed for treatment.

Case Six. A 32-year-old male was examined on October 29, 1953, He was charged with violation of Section 288 of the Penal Code. He pleaded not guilty and was tried and found guilty. He was examined in order to determine whether or not he was a sexual psychopath and whether he was a menace to the health and safety of others.

The patient related that he was accused of having had intercourse with his stepdaughter but denied that he did this. He continued that his trial was held on October 20, 1953, and that he was found guilty of Section 288 of the Penal Code of the State of California. He related that he was found guilty of "playing around." By this he meant he fondled her genital organs and added that this was at her request. His stepdaughter was 12 years of age.

The offense was alleged to have occurred about five times. His explanation of the situation was that he first resented his stepdaughter's overattentions to his own baby. One night she got up to attend to the baby while his wife, who works, was asleep. She then crawled into

the bed where he slept, placing the baby between them. He continued that she placed her leg over his and added, "I played around a little bit." By this he indicated on further intensive questioning that he placed his hands on her breast and she seemed to enjoy this. No intercourse was attempted.

His stepdaughter was always saying that she was "hot—that she wanted things. I just couldn't keep her away from me." He did not tell his wife about this situation and realizes now that he should have told her. He continued that his stepdaughter would follow him around the house and would "egg me on."

He worked from 8:00 a. m. to 4:30 p. m. as a railroad maintenance man. His wife was working from 3:00 to 11:00 p. m.

He stated that he had been in bed with his stepdaughter about five times. The girl brought charges against him after his wife had confronted him with a pair of her panties with "stuff on it." He continued that his wife realized that she had made a mistake, that she thought the underpants were her daughter's but that they were her own and that she learned this later. He believes that his stepdaughter is of "loose morals" and that she has had sexual relations with a neighbor boy. He continued that in Court the girl accused him of having had intercourse with her. He added that his wife "forced" the admission from her daughter. His wife brought charges against him with the police department at a time when she was angry. She realized later that she had made a mistake and that she should not have done this.

He had sexual intercourse with his wife about three or four times a week. The relationship was satisfactory to both. He continued that "She wants it more than I do," and added that his wife was pregnant and that the baby was due in about two months. He had never had homosexual relations and denied any perversions or abnormal sexual activities other than those stated under the history of the present alleged offense.

He denied any arrests whatsoever except for speeding and traffic violations.

The patient gave a fairly good account of himself. He spoke freely, clearly, and relevantly. However, he seemed somewhat dull intellectually and showed a considerable degree of obtundation of intellect and morality. He showed little evidence of guilt reaction. He said he felt guilty of "playing around" but continued that "she forced me—she egged me on." When asked why he did not tell his wife about the difficulty he answered, "It's just one of those things." There was no grossly abnormal mental content.

He was not found to be suffering from a mental disorder making him a menace to the health or welfare of others except insofar as he was a menace to the health of the girl in question. In view of these circumstances, it was recommended that the petition of sexual psychopathy be dismissed and that the defendant should be held to answer on the criminal charge.

Discussion

The cases present excellent examples of how the societal system operates in conjunction with personality disturbance to produce abnormal behavior. The sexual acts for which the patients were convicted would not have occurred but for the concurrence of the neurosis and the milieu in which to act. The existing neurosis combined with the presence of the stepdaughter in full bloom drove the patient into acts of sexual perversion. The interaction of these two forces developed each into a paraphiliac neurotic.

The girls did not object to or resist the advances made by the enamored patients. What's more, in case number three, the girl "encouraged" the patient and she "returned his affection." In case number six the patient would "fondle her genital organs at her request," and she would "egg me on." In case number four the patient was not sexually satisfied with his wife and there was a marked situational element present in that his wife was away and his desirable young stepdaughter was available. This presented the opportunity for the abnormal incident.

In case number six the sexual offense was the result of a situation in which there was a pregnant wife who was no longer sexually attractive and in which there was a beautiful young girl who showed an unusual degree of sexual curiosity, maturity, and experience for the age of twelve years.

The theory behind statutory rape and kindred offenses is that girls of tender age, undeveloped intelligence, and limited experience are not capable of appreciating the nature and consequences of their acts and for this reason they do not have, in legal contemplation, the capacity to consent to such acts.

When young girls appear precocious with regard to sexual matters, egg their stepfathers on, and request them to fondle their genital organs, the law should consider the age, intelligence and experience of the "offendee" irrespective of her chronological age.

A more adaptive application of Section 288 (California Penal Code), is suggested in order to provide more humane therapy, for the existence of and the present method of enforcement of this statute often produces a *"status crim-*

inal." The patient is prosecuted because his wife's ego has received a severe blow. She is infuriated at the idea that he finds her daughter more beautiful, desirable, and passionate, and in a fit of anger she "turns him in." He is prosecuted, convicted, and given the status "sexual pervert." He is sent to prison and while he is there he is treated as a "sex pervert." During his term his wife divorces him, which is her way of saying, "you are a sex pervert." His wife and society treat him as a "sex pervert" and expect him to act accordingly. He now expects of himself "sexually perverted" behavior.

To avoid the moulding of "sex offenders" a system should be introduced wherein the patient would be treated in a manner designed to give him insight into his problem, and therein the stigma attached to criminal status would be avoided. Section 288 (California Penal Code), should especially be relaxed in cases where the stepdaughter is the aggressor.

It is believed that Section 5500 of the Welfare and Institutions Code of California is beneficial to society and to the defendant, for its purpose is the treatment of the defendant by medically-trained personnel. However, the objectives of this statute will remain nugatory until a method of circumventing Section 288 (California Penal Code) is devised, for the prosecution and conviction under Section 288 (California Penal Code) is in essence labelling the defendant a "sex offender."

A study of the wives involved may be of some importance, since they all are divorcees and this in some cases may be an indication of unstable personality. Presumably the behavior of the wife may have contributed to the development of the neurosis in the husband.

Conclusion

The present study is concerned primarily with the "sexual psychopath" law of California and cases that have come to attention because of this law. The cases studied were selected because of the similarity of motivating mechanisms. Factors of common denominator seemed to lead to the crimes, hence the term "the stepdaughter paraphiliac neurosis."

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Death by Hanging of Adolescent and Young Adult Males

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In cases of hanging, to determine that the manner of death is suicidal is ordinarily no great problem. The body is found more or less suspended, usually with the feet on the floor, or on occasion, even half reclining in bed. In one case, a pharmacist, depressed over impending business failure, elected to hang himself with his belt from the head of the bed while in a semi-lying position even though he had at his command an inexhaustible stock of toxic materials. Two-inch-long parallel linear contusions were the only indications of cause and manner of death. Determination that death by hanging was suicidal often depends on collateral evidence such as the discovery of business reverses, depression, previous threats of suicide, or even simply a note expressing either farewell, spite or giving instructions as to the disposition of property. Sometimes there is evidence of attempts at suicide by other methods such as cutting. Occasionally, the fact that death is due to hanging is itself obscure because the body is found by relatives who cut it down, dispose of the noose, and then summon unsuspecting physicians to give emergency treatment. When the decedent is promptly cut down after death by hanging, there may be minimal evidence on the skin of the neck that a noose was ever applied, particularly when cloth padding is placed beneath the noose. In the last four years in the medical examiner service of the State of Massachusetts, four concealed deaths by hanging have been recognized only by careful routine examination of the dead body. In each of these four cases, relatives provided documentation of disabling disease, either true or concocted.

Often, there are no distinctive injuries indicating that death was due indeed to hanging. There may be congestion of the head and face above the level of the ligature with petechiae in the fascia about the skull and subconjunctivally in the eyes. The occurrence of such petechiae is dependent upon the tightness of the noose. They are found usually in hanging where there is partial suspension of the body so that venous return from the head is obstructed along with respiratory obstruction, but the arterial outflow to the head is not wholly impeded. In consequence, the capillary bed of the tissues above the noose becomes distended and small hemorrhages occur. Petechiae are more often found in strangulation by ligature without suspension. When the full weight of the body tightens the noose, the arterial outflow to the head is usually obstructed, and there is no appreciable difference between the tissues above the noose and the tissues below it. Only when there is a considerable drop in the initiation of hanging is deep injury to the structures of the neck to be expected. The characteristic appearance of the groove caused by prolonged suspension with considerable weight tightening the noose is that of a furrow with abraded margins and a parchment-like yellowish discoloration of the depths of the groove. The parchment-like appearance results from crushing of skin and underlying fat. The liquid fat then penetrates the skin, giving a greasy, or when dry, parchment-like appearance. The most marked portion of the groove is usually opposite the knot. Recently we have seen a typical groove about the neck of a living man with serum exuding from the central crushed area. The worn-out clothesline, serving as a noose, broke and he was found unconscious on the basement floor and subsequently revived. The groove characteristic of hanging may be found not only in the living, but may also result when a dead body is supended following death (1). For this reason alone autopsy of hanging cases is desirable. There is danger of error in assuming necessarily that a body found hanging has died in a suicidal manner.

On a rare occasion, hanging is homicidal. The body of a woman was found nude in a second-class frame hotel. The morning of the previous day, a man presumed to be her

husband, notified the room clerk that he was leaving a day in advance and that his wife would settle the bill. He said she planned to sleep, and he left a "Do Not Disturb" sign on the door of the room. On the afternoon of the day following, the maid disregarded the sign and entered the room to find the woman naked in a semi-crouching position against the wall with a fire escape rope looped twice around her neck. In addition to numerous abrasions due to the rope, there was an abrasion of her chin, apparently unrelated to the rope. The blood alcohol was 0.28 grams per 100 ml. The only disturbing observation was the nudity of the decedent. Women ordinarily avoid being found dead naked. When apprehended later, her companion confessed that he had struck her on the jaw and then, while she was unconscious, dragged her to the rope, supported the body with one arm and his feet and then looped the rope twice around her neck. This is the only *recognized* homicidal hanging in Massachusetts since 1620.

An unusual group of cases can be recognized in which the decedents are all adolescent or young adults and all male with no history of depression, no suicidal note and no discernible reason for suicide such as financial difficulty or impending scholastic failure. Certain peculiarities are common to many in this group. Sometimes they are found with feet or hands restrained. Sometimes they are dressed in female attire and sometimes the genitalia are conspicuously the center of attention at the time of death (2). Six cases of this kind have come to the attention of the Department of Legal Medicine in Harvard Medical School during the last few years. Four of these have not been handled firsthand but have been documented carefully by verbal description or photographs so that they are easily recognized as part of the group.

Case 1. A boy 15 years of age, a high school student, accomplished musician, athlete, and good student, was never known to be moody, was liked by his classmates and doted on by his parents. He returned from school one afternoon, greeted his mother, apparently in good spirits, and left to play in a shed. His mother later sought him but finding the shed locked, assumed he had gone elsewhere. Later in the afternoon, the father returned home and forced an entry through a window into the shed. The boy was found hanging. His head was

shrouded in a sock with a slit cut for the mouth. A noose was tied about his neck with the rope passing over a rafter, and downward behind the body through the crotch and tied about the scrotum above the testicles. The genitalia were exposed and a piece of fur was placed against the scrotum. Death was officially ascribed to suicidal hanging.

Case 2. A 41-year-old single male was found hanging in the basement of his home by his brother. The noose was about his neck with the rope passing upward over a rafter, and down to the floor where his foot was placed in another loop. The penis protruded and the shorts were stuffed with cakes of soap with a copper penny in contact with the scrotum. The legs of the shorts were tied to retain the cakes of soap. His brother reported no depression or unusual behavior. Death was officially ascribed to suicidal hanging.

Case 3. An attorney requested a consultation concerning the death of his client's husband. The decedent, a man 36 years of age, was weeding a backyard garden during the forenoon. One-half hour later he was found by a neighbor hanging in a doorway inside a shed. The feet were on the ground, the fly was open and the penis protruded. The rope was fastened to a hook in the center of the doorway. Death was officially ascribed to suicidal hanging. The lawyer vigorously asserted, however, that the family knew of no financial difficulties and that the decedent had at no time been depressed. He advanced the theory that death was accidental, and stated that the rope had frequently been observed hanging, not in the doorway, but looped over an adjacent hook to permit free passage through the door. The attorney postulated that in running through the shed, the decedent had accidentally thrust his head through the noose, swinging in the doorway.

Case 4. A 17-year-old boy was found hanging from the water pipe in the basement of his home. Over his head was a hood made from a rubber raincoat. A noose was tied about his neck over the raincoat and the rope ran upward over the water pipe, passing downward with the other end tied about his wrists behind his back. All of the knots could have been self-tied. A rope was tied about the ankles. The genitalia were not exposed. In the past the boy was known to have received telephone calls from a scoutmaster jailed for homosexual activity. Several days following the death, the boy's father discovered in his room a clay effigy of a human being with a rubberized cloth hood held in place about the neck with a noose.

Case 5. A well-developed 13-year-old boy, unusually mature, was found hanging from a water pipe in the basement of his home by his father. He had shovelled snow during the morning, re-entered the house, spoken with several of his sisters, and was found dead shortly thereafter. About his neck was tied his woolen winter scarf which passed through a loop of coarse fiber rope tied to the pipe. His feet were on the floor. He wore a sweater, a union suit and sox. His other

clothing was piled beside him on the floor. The union suit was unbuttoned and his penis protruded. The legs of the union suit were pulled up tight on his upper thighs. About his ankles was tied a loop of string neatly with a bowknot. Death was certified by the Boston Medical Examiner's Office as accidental hanging while at play. Two weeks later the Medical Examiner received a visit from the decedent's five older sisters and mother. The family had previously written a protesting letter to the newspaper that had printed the cause of death as suicide. Now they were curious to know why the Medical Examiner called death accidental. Only at this meeting was the Medical Examiner informed that the genitalia had been exposed. The sisters, after a search of the cellar, had found five other rope loops hanging from pipes and themselves suggested that his action was repetitive.

Case 6. A 20-year-old college sophomore, a part-time hospital employee, was found hanging in chains in his room in the hospital. The chain was of light construction and was used for hauling trash barrels in the building. It was wound twice around his neck and secured behind the head with a padlock. The other end was secured to a steampipe near the ceiling. The feet were on the floor, the legs slightly bent. The body was dressed in a jacket, riding britches, and cowboy shoes. About his ankles was a short length of chain secured with a padlock. On the seat of his trousers, there was a fluff of dry shaving cream, the source of which was a can on his desk. On each of his cheeks there was a broad smear of feces. The trouser fly was buttoned, but the penis protruded from beneath tight shorts down the left leg in a partially distended state. On the floor beneath the body there was a leg and waistband from a pair of pajama pants. On this cloth were several smears of lipstick and eight areas of dried seminal stain, each consistent with a single ejaculation. Scattered on a table and plastered on the walls were numerous pictures of his fiancee, frequently wearing jodhpur riding trousers. On his desk there was a paperbacked novel with the title "Women Must Weep," a textbook entitled "College Psychology" and a note with the text "Jodhpur girl. If I lose I will wear my breeches. If I win I will go as a cowboy. One set of pennies." Signed "Breeches Boy." Death was certified as accidental hanging while experimenting. The boy's parents were community leaders and when questioned by a psychiatrist could give no help towards the explanation of the circumstances surrounding his death.

Discussion

Little is found in textbooks of legal medicine concerning the death by hanging of young males in the course of autoerotic activity. Much of the older literature ascribes such deaths to mental disease of sudden onset. It is our contention that a repetitive autoerotic diversion is practised using a noose as a psychic and probably physiologic stimulus. Psy-

chic stimulation is also manifest in those cases using restraints on hands or feet and in the single case with fecal defilement. The note in case 6 suggests that the boy knew the hazard of the game. The multiplicity of nooses in case 5 and the pajama leg fetish in case 6 emphasize the repetitiousness of the practice. None in this group includes the use of female attire as do several in the cases of A. Warren Stearns (2).

Conclusions

1. Six cases of accidental death by hanging during autoerotic activity by males are presented.
2. Aspects common to all are suspension with the feet on the floor and genital activity.
3. Restraints on the extremities represent psychic stimulation not evidence of assault.
4. Repetitive activity indicates that death is not the purpose of the noose.

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Seminar on Testimony*

Participants: Ordway Hilton, M.A.; David J. Purtell, Ph.B.; Harry M. Ashton; C. D. Brooks, B.S.; Donald Doud

Introductory Remarks

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Courtroom testimony is an important phase of questioned document work. Unless it is done well, the best and most careful laboratory examination of a disputed writing may be of no avail. Through testimony we tell our story to the court or jury. There are many things to keep in mind and many special problems connected with it. It is the purpose of this seminar to discuss some of these factors—both the mechanics of courtroom presentations and the special refinements which can lead to more effective testimony.

It was the desire of the majority of Questioned Document Section members to develop a program devoted to testimony. Having made the decision, however, they left the problem of how to do it best to those of us who were to execute it.

None of us here are "expert" expert witnesses. Thus, no one can tell how to do the job perfectly. Those of us who are participating in this discussion hope to learn just as much from this session as each and every person present. This is an opportunity to exchange ideas and methods. It is very doubtful that we can establish what is the best or what is the right way of handling every situation although we may well agree on how to approach certain aspects of testimony. Rather, we are trying to find out what others do and just how successful their ways are compared to ours.

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Actually, what works for one individual may not work for another. A great deal of testimony is highly personalized although the mechanics of presentation should be similar for all workers. Each of us has the same bones in our skeleton, but the way flesh and skin are packed around them makes each a different appearing person. So, too, with the testimony; we each build a different presentation around a similar framework. Some witnesses handle a difficult subject in one way, whereas another witness would be a miserable failure if he attempted to follow exactly the same procedure. You can imagine how ineffective you would be if someone else wrote out your testimony, and you memorized it and recited it purely from memory. It might well be a much clearer explanation of the problem than you personally could give, but it would lack your personality. It would lack the naturalness that is yours. By the same token, testimony in a court in New York City may require a somewhat different approach than testimony on the same subject in a rural section of Kansas. Certainly, references to daily experiences of the jury would differ, but parts of the testimony might be slightly rearranged to conform with the usual practices of court. Nevertheless, it can be hoped that each one of us present will get new ideas to take home and try out; that from this seminar we find ways of improving our courtroom presentations.

The divisions for the present discussion are made on a rather mechanical basis, following to some extent the problems as they are encountered in the course of a presentation. The topics are: "Qualifications," by David J. Purtell; "Organization and Presentation of Document Testimony," by Ordway Hilton; "Illustrating Testimony," by Harry M. Ashton; "Cross Examination," by C. D. Brooks; and "Special Problems," by Donald Doud.

Qualifications

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The presentation of an expert's qualifications is the pleading to or asking of a court to listen, accept, and recognize

the witness because of his superior knowledge of the subject that he acquired by scientific and technical training. This presentation should not only show the abilities of the witness but must also meet certain legal requirements.

The sufficiency of the witness' qualifications rests almost entirely within the discretion of the court. Usually, objections to sufficiency of qualifications goes to the weight rather than to the competency of the witness' testimony.

The qualifications should include the contributions that have been made by the witness to the field in which he is testifying. These would include the articles and books written about the subject, classes and schools attended regarding the subject, and membership in professional societies. The number of actual cases handled, the number of times the witness previously testified, and the formal education of the witness can be mentioned. The actual studies, research, and comparisons made of the problem involved, are more important than the actual things handled. An example is a bank employee who handles the cancellation of millions of checks but never makes a handwriting comparison.

The demeanor of the witness should never go to either extreme of too humble or too boastful. He should be as concise as possible but must put forth enough to convince the most skeptical juror. He must not be too lengthy, for the patience of the court will be tried.

A typewritten copy of the qualifications in narrative form should be presented to the attorney before trial, and preferably during a pre-trial conference. It should include a resumé of what one has done covering education, study, cases, previous testimony, writings, and professional societies. Also, a new set of qualifications should be prepared to fit each case.

The question-and-answer type of presentation appears to be the best, but a narrative style can be used very effectively by some witnesses. No matter which is preferred, or the manner of presenting selected, it can be changed by the attorney who wishes to follow his own procedure.

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Organization of Testimony

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In this portion of the program these preliminary remarks shall be confined to that part of expert testimony in which we detail the reasons for our opinion. This stage of testimony cannot be undertaken haphazardly. If we are to do a good job, we must have a basic plan.

This writer's procedure—and this is used by other experts—is to start the discussion of reasons by a restatement of the opinion. The question to you to introduce your reasons must be so framed that such a start will be responsive. You can control this by having your attorney ask you to state the reasons for your opinon. A responsive answer then can start: "The reasons for my opinion that . . ." By this point in the presentation the jury already knows what the opinion is, but generally there have been intervening interruptions, such as the introduction of photographs, and they may have forgotten its exact statement. So much new material has been thrown at them since you have taken the stand that they might even expect the answer to this question to deal with something new. By restating the opinion they know that now we are getting back to the basic issue, and they are going to hear more about it.

This writer's answer continues with a summary in general terms for the reasons that he has reached the opinion. For example, in a handwriting case he refers to the writing quality—speed, skill, freedom, starts and stops, etc.—and to the individual writing habits—slant and form. This is the framework, and now we are ready to develop the presentation.

What follows is a discussion in sufficient detail of each of the factors. It is well in discussing them to relate their significance to the basic opinion. In this way there is repetition of the opinion, but in a subtle way. Actually, an unevaluated reason does little to strengthen an opinion. It is important to remind the jury how each part adds to the whole.

The final step in this presentation is the ultimate summary, going back and tying together the different reasons or the salient points that in combination establish the opinion. It is well to end the testimony with a clear-cut statement of how you stand on the basic problem.

This is a formal presentation. The outline is mechanical. It can become very formal and very mechanical if we are not careful. While familiarity with an organized program like this is essential to consistently good testimony, it is the framework, and the witness will do well to work around it loosely rather than too closely.

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Illustrating Testimony

Harry M. Ashton, Cincinnati, Ohio

In illustrating testimony, the use of photographs is very important in the presentation of document testimony. Illustrative photographs aid the court and jury in following and understanding the explanations and reasons given for the opinion expressed by the witness. The kind of photographs used is determined by the nature of the case and what seems to be the best and most convincing manner of showing and illustrating the evidence. In general, smaller, individual photographs or charts, furnished to each juror or to each two jurors, the court, counsel, and the witness, are usually preferred over the large bill-board type photographs; although, in some instances the latter may be used advantageously.

The amount of enlargement is determined in advance by the type of photograph to be used; that is, a photograph to be held in the hands will not require as much enlargement as one to be placed some distance in front of the jury.

It is advisable to have a pair of scissors available, or strips of adhesive tape, to cut out or block out portions of the

photographs in the event some documents, portions of which have been used in the photographs, are not admitted in evidence.

It is not advisable to ask jurors to use a microscope. Most jurors are not accustomed to using microscopes and more than likely they will not be able to make proper adjustments and see what it is desired that they see. A microscope might be used under certain circumstances if the trial is before a judge without a jury. Ordinarily, it is better to provide microscopic evidence in the form of photomicrographs or photomacrographs. Under certain circumstances, such as showing color in differentiating between ink lines, a projector for opaque colored objects may be used if the courtroom can be made sufficiently dark.

Drawings on a blackboard or on a pad of drawing paper may sometimes be used advantageously in illustrating and explaining certain portions of testimony. These drawings may be used as an adjunct to photographs or when circumstances do not permit making photographs in advance.

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Cross-Examination

C. D. Brooks, B.S., Birmingham, Alabama

Cross-examination is a part of the testimony in which the expertness of the witness as a witness may be demonstrated. As an expert witness one should be prepared adequately for cross-examination of any type.

By definition, cross-examination is that part of the testimony elicited by parties adverse to those who called the witness. Among the purposes are the exploration and demonstration of any inaccuracy of the direct testimony or incompleteness of it, the possible lack of qualification of the expert, whether the questioned or standard writings were inadequate for the examination and opinion, and whether the

opinion was based on illegal, that is, inadmissible, standards. Another purpose of cross-examination is the exploration and demonstration of any bias in the witness, whether for financial gain or otherwise—for example, because of social relationships. Frequently, an important intent of the cross-examiner is to confuse the jury or to confuse the witness and thereby induce the witness to make statements which are damaging to his reputation or to the issues he supports.

The methods employed may be straightforward, they may include slight insinuations, or they may be insulting and abusive.

Cross-examination may include the classical test of handwriting experts. This is done by handing the witness a piece of paper on which has been written a series of names and insisting that he immediately given an opinion as to whether the series of names were written by one writer or more and, if by more than one writer, how many and, if more than one were written by the same writer, which ones and how many. This is an impossible assignment, of course, and it should be anticipated and prepared for by including in the direct testimony an explanation of the method employed in scientific examinations of handwriting.

The necessity for including in such the explanation of all the factors involved, including the necessary time and the availability of instruments and the very important adequacy of material for examination, is emphasized by the following incident: by neglecting to include a statement of the principle that a limited amount of questioned writing may not afford sufficient basis for a definite conclusion or opinion, a witness may be obliged to express a qualified opinion in such a test.

The use of books in cross-examination is important. The cross-examining attorney attempts to obtain from the witness an admission that a book is an "authority" and then, by quoting from this book some passage which appears to be contradictory of the witness' previous testimony, attempts to show that the witness disagrees with authorities on material questions. Some attorneys in cross-examining the witness may attempt to elicit a statement from the witness that he has read and is familiar with a book, the title and author of

which is entirely fictitious. The expert witness is admonished, therefore, to be extremely careful and not to permit acquaintance with any suggested book unless he is positive of his memory of the title and author.

Cross-examinations including slight insinuations or definite insults are encountered. An example is an incident in which the cross-examining attorney continued to refer to the witness as a "questionable document examiner."

The right of the witness under cross-examination to an opportunity to answer questions completely is important. The tactic of some lawyers in interrupting the witness before he has an opportunity to complete an answer is a most vicious method of cross-examination and one to which the professional expert should not fall victim. He should know how to combat it by insisting upon his right to complete his answer without interruption.

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Special Problems

Donald Doud, Milwaukee, Wis.

Humanizing Testimony.—Testimony of a technical nature should not be too formalized and rehearsed. It is imperative to simplify language, using common everyday experiences to illustrate various points, and to speak directly to the jury as though you were conversing in your own home.

Hypothetical Questions.—This has very little place in questioned document testimony. This is illustrated in one instance of successful use where the plaintiff claimed she lost use of her right arm as a result of an explosion, and thereafter could only manipulate the left arm and hand. A hypothetical question based on the purported circumstances of the accident and the claimed injury, coupled with numerous writing standards written before and after the incident, laid

the groundwork for an opinion that no observable difference existed in the writing of the plaintiff before and after the purported explosion.

Qualified Opinions.—There are some who are of the opinion that it is the duty of experts to aid the court to whatever extent they can, although admitting that their experience in government service made it easier for them to render such qualified testimony. There are others who believe that qualified opinions are not desirable, and leave the expert open to damaging cross-examination and criticism by the court. In one instance an expert was told by the court that he had no business testifying if he could not express a positive opinion.

Redirect Examination.—Many experts do not favor redirect examination, unless some misconception of real importance was established on cross-examination. Mr. Hilton suggested use of the statement: "Mr. Witness, has anything been brought out on cross-examination that in any way modified or changed your opinions?" The negative answer to this question takes care of almost any exigency arising out of cross-examination.

Appearance with Other Experts.—It was the consensus that expert witnesses, even if on the same side, should maintain an independent attitude both in testimony and in personal conduct in the courtroom. They are presumed to have reached independent opinions, and the jury should not get the idea they were influenced by each other or that they had collaborated in some improper way. Where opposition occurs, it is held permissible to supply your own attorney with cross-examination questions for the opposition and to aid him in any way possible to bring to the jury's attention the errors in the observation and reasoning processes of the opposing experts.

Examiner of Questioned Documents
312 East Wisconsin Avenue
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Commonwealth of Virginia
Office of the Chief Medical Examiner

The Department of Legal Medicine of the Medical College of Virginia, the Chief Medical Examiner's Office and the Virginia Society of Pathology and Laboratory Medicine are sponsoring a Medico-Legal Workshop for Medical Examiners, Pathologists and other interested Physicians, on Friday, March 29, 1957 from 8:00 a. m. to 4:30 p. m., in the Amphi-Theater and Baruch Auditorium of the Medical College of Virginia, Richmond, Virginia.

The Medical Examiners will have an opportunity to make investigations with special references to general examinations of bodies, photographic techniques and the use of body fluids in medico-legal investigations. They will have a joint session with the Pathologists, wherein gunshot wounds and special techniques with reference to this subject will be discussed. The Pathologists will see practical demonstrations of the medico-legal autopsy techniques to be employed in deaths involving stab wounds, gunshot wounds and motor vehicle-pedestrian injuries. Stab wounds and gunshot wounds will be inflicted and demonstrated.

The registration fee is $25.00 and registration is limited. For further information, address inquiries to Geoffrey T. Mann, M.D., LL.B., Chairman, Department of Legal Medicine, Medical College of Virginia, Richmond, Virginia.

Administrative Procedure and Scientific Evidence

Sidney B. Schatkin, New York, N. Y.

In our zeal to have the courts accept proven scientific discoveries, we have overlooked the benefits to administrative departments of the government of such established scientific facts. A case in point is the Registrar of Vital Statistics of the Health Departments. The Registrar is a quasi-judicial officer, vested with discretion and judgment. His decisions, however, must be within the framework of the law, both statutory and decisional. And in order for him, a quasi-judicial officer, to function effectively, he must familiarize himself with the law, statutory and decisional; observe developments; and (like an informed court of law) be ready to apply accepted scientific discoveries.

Regularly, the Registrar is called upon to correct a birth certificate under the following circumstances: The mother is married, but separated from her husband; a child is born to her at least one full year after separation from her husband, during which time there has been total nonaccess; the husband's name is inserted in the birth certificate as the child's father, although clearly the child's true father is another man; the mother applies to the Registrar to strike from the certificate the husband's name and insert that of the true father. The Registrar is then confronted by the almost impregnable presumption of legitimacy, and in all likelihood will refuse to change the certificate unless ordered to do so by the court.

If we read the statute carefully (at least in New York) we will find that this ancient presumption is not impregnable at all. The New York statute (New York City Criminal Courts

Act, Article V, Section 61) gives a four-fold definition of an illegitimate child as one that is:

1. Conceived and born out of lawful matrimony.
2. Conceived and born one whole year after the mother has been separated from her husband.
3. Conceived while the husband is impotent.
4. Conceived and born while the mother and her husband have been separated pursuant to a decree of a court of competent jurisdiction.

For the purposes of the Registrar, subd. 1, above, merely stating a conclusion, adds nothing new. Of course, it is clearly applicable if the mother was single at the time of conception and birth of the child.

On the other hand, subds. 2, 3 and 4 are extremely important to the Registrar. For, if there was one whole year's separation; or if the husband was impotent; or if husband and wife were separated pursuant to a court judgment; there is actually a presumption of illegitimacy!

If the mother consults the Registrar, and the facts she presents fall within subds. 2, 3 or 4 of the New York statute, the presumption of legitimacy (long a stumbling-block to the Registrar) gives way to a presumption of illegitimacy.

When the mother in a paternity case in New York testifies to one whole year's separation from her husband, by that testimony she establishes *prima facie* a case of illegitimacy.

The presumption of legitimacy has been weakened by scientific blows. The National Conference of Commissioners on Uniform State Laws, with the approval of the American Bar Association, on September 8–13, 1952, adopted the "Uniform Act on Blood Tests to Determine Paternity," Section 5 thereof providing as follows:

> "The presumption of legitimacy of a child born during wedlock is overcome if the Court finds that the conclusions of all the experts, as disclosed by the evidence based upon the tests, show that the husband is not the father of the child."

In this day and age, the Registrar, like the courts, must avail himself of the proof offered by Science. In a case where

the presumption of legitimacy is a legal block to action, why should not the Registrar demand a blood test of the mother, child and *husband,* to see whether the latter can be excluded as the father of the child?

The State of New Hampshire adopted the Uniform Act on Blood Tests, with Section 5 prescribing that the presumption of legitimacy is effectively overcome by blood tests excluding the husband (Laws 1953, Chapter 126, in effect April 29, 1953).

The National Conference of Commissioners on Uniform State Laws, in its Prefatory Note to the proposed Uniform Act on Blood Tests to Determine Paternity, stated (Note 7):

> "Most states have a strong presumption of legitimacy—in fact, a conclusive presumption of legitimacy of children born in wedlock except in such situations as impotency, nonaccess, and a child of a different race."

The Registrar, in the writer's opinion, is functioning within the framework of the law if he demands, and acts upon, proof of nonaccess, impotency, etc.

Hughes v. Hughes, reported in Volume 271 Pacific 2d, page 172 (decided by the California District Court of Appeals on June 7, 1954) involved the construction of Section 1962, subd. 5, of the California Code of Civil Procedure, which provides:

> "The following presumptions, and no others, are deemed conclusive:
> "5. The issue of a wife cohabiting with her husband, who is not impotent, is indisputably presumed to be legitimate."

In the Hughes case, although the title of the action might indicate otherwise, a wife sued a man, not her husband, for the support of her child. The wife and her husband, Annabelle and Frank Harbrauth were married in 1932 and lived together continuously until October 1952. Under those circumstances, with continued cohabitation, there was clearly no impotence. Consequently, it would appear from subdivision 5 of the above statute that there would be an indisputable presumption of legitimacy. The wife first had sexual relations

with the defendant Hughes on October 6 or 7, 1952 and the child was born on June 29, 1953. The Harbrauths, husband and wife, became reconciled in February or March, 1953 (at which time she was well advanced in pregnancy) and were living together at the time of the court hearing. Clearly, it could not possibly be claimed that the husband Harbrauth was ever impotent. At the hearing medical testimony was given that the husband Harbrauth was sterile.

The defendant Hughes, appealing from the judgment against him, contended that the husband Harbrauth must be conclusively presumed to be the father of the child in the absence of proof of his impotency. Subdivision 5 of the above statute made the presumption of legitimacy conclusive in the absence of a showing of impotency.

From the inception of the presumption of legitimacy in the Law of England some hundreds of years ago, the husband's impotency has always been written into the law as a circumstance rebutting that presumption. In the statute, § 1962, subd. 2 of the California Code of Civil Procedure, a husband who is not impotent is conclusively presumed to be the father of his wife's child. In the Hughes case the California court, although recognizing that the husband was not impotent, nevertheless permitted medical evidence of sterility to rebut effectively the presumption of legitimacy and affirmed the judgment. Thus, another inroad upon the time-honored presumption of legitimacy.

In Hogeboom v. Hurlburt, 207 Misc. 997, 141 N.Y.S.2d 691 (New York, 1955) a paternity case, the complainant's testimony of sexual relations, conception and birth of the child, was uncontradicted by the defendant, who did not take the stand. His defense consisted of medical evidence of his sterility. The medical evidence of sterility was given decisive effect by the court, which dismissed the complaint.

In Department of Public Welfare of City of New York v. Hamilton, 282 App. Div. 1025, 126 N.Y.S.2d 240 (New York, 1953) judgment of filiation was reversed and a new trial ordered. The appellate court stated in part:

> "In our opinion the trial court should have granted an adjournment upon the statement of defense counsel that he had additional medical testimony to prove that defend-

> ant was sterile in March, 1951, the alleged time of the conception. The undisputed expert testimony established that the defendant was sterile in February, 1953. The issue of fact was close and such additional testimony would have had material weight in making a decision. Upon the new trial, however, expert scientific testimony would be admissible to show that in the course of nature it would be impossible or improbable for the putative father to have begotten a child bearing certain racial characteristics displayed by the child whose paternity is in issue."

The presumption of legitimacy is not as sacrosanct as formerly. The rebutting circumstance of impotency may now (in California) include sterility. The defense of sterility, adequately established, is now accepted by the courts as proof of nonpaternity. As stated above, the presumption of legitimacy, under certain circumstances, gives way to a presumption of illegitimacy.

A blood test exclusion effectively shatters the presumption of legitimacy. This scientific tool, the value of which is recognized and accepted by all informed courts, can be equally effective in the hands of the Registrar.

Blood tests are of decisive value when they exclude paternity; the inconclusive, nonexclusionary result establishes merely the possibility of paternity. Twenty years ago—1936—the chances of obtaining an exclusion were 33⅓ per cent. Today, the chances are nearly 55 per cent. With the discovery of each new blood type, the chances of obtaining an exclusion are increased. Is it not of value for the Registrar to know that an inconclusive, nonexclusionary result is fast becoming almost circumstantial evidence of actual paternity?

Blood tests involving rare types are singled out for special consideration; the results in such cases constitute extremely persuasive circumstantial evidence of paternity.

A Supplementary Report of the Committee on Medicolegal Problems of the American Medical Association, released in 1955, states (pages 14–15):

> ". . . there are certain unusual cases which cannot be ignored, where the use of blood tests as circumstantial evidence of paternity or maternity appears to be justified.

> For example, if the putative father belongs to type rh″, the mother to type rh, and the child to type rh″, the conscientious examiner will feel obliged to call this unusual circumstance to the attention of the court. Since type rh″ occurs in less than 0.5 per cent. of the population, the coincidental presence of this type in the child and the accused man is circumstantial evidence of paternity. . . ."

The Lie Detector today is routinely applied by the Domestic Relations Court in Cook County (Chicago) Illinois, and it is widely used by business concerns. In the hands of a skilled examiner, the margin of possible, *real, actual* error is less than one per cent. Is this not worth investigating by a Registrar in a proper case, where such procedure is indicated?

It must be emphasized, with the Lie Detector (Polygraph) as with blood tests, only a handful of highly qualified, skilled technicians and scientists are available. In the United States there are perhaps 20 serologists fully qualified to carry out blood tests. There is a similarly limited number of fully qualified polygraph experts. There are any number of alleged experts, operating polygraphs costing about 50 dollars. A reliable, fool-proof pathometer (polygraph) is worth $1,000 or more.

The Science of Anthropology has something to offer. In Estate of Walker, 180 Cal. 478, 181 Pac. 792, the California court stated:

> "The only exception to this (presumption of legitimacy) . . . is where it is clear that, although the husband had intercourse with the wife, yet by the laws of nature it is impossible for him to have been the father, as, for instance, where husband and wife are white and the child a mulatto."

The Registrar, if he takes careful and accurate note of the development of the law, and the achievements of Science, can apply them quasi-judicially, and without the prohibitive burden to the interested parties of expensive and time-consuming litigation.

Conclusion

It is no doubt apparent that the foregoing observations are not conclusive. Rather, they are intended simply to describe certain trends, and to point out sign-posts along a course that will be charted by an alert, informed and imaginative Registrar.

Forensic Medicine may profitably become part of the arsenal of the administrative officer, Registrar or otherwise.

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FELLOWSHIP IN FORENSIC MEDICINE

Department of Pathology, Western Reserve University
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Training in Forensic Medicine is offered to qualified individuals with a minimum of three years experience in general pathology. The appointment is for one year, and the period of training is accredited by the American Board of Pathology. The annual stipend is $5,000.

The practical work is carried on in the new Cuyahoga County Coroner's Laboratories located on the campus of Western Reserve University and includes approximately 1200 medicolegal autopsies per year.

Personnel and facilities for training in gross and microscopic pathology, forensic chemistry (toxicology), gross and microphotography, trace evidence and forensic immunology are excellent. Fellows will have an opportunity to participate in "on the scene" investigation of violent, suspicious and unexplained deaths. Instruction is provided in the administrative aspects of the modern medicolegal office and legal procedures affecting forensic medicine. An active research program is in progress in several phases of forensic medicine.

Experience in courtroom work is an essential part of the program and special attention will be devoted to instruction in the presentation of medical evidence in civil and criminal proceedings, both in trial courts and before the Grand Jury and Industrial Commission.

The Cuyahoga County Coroner's Office is an integral part of the Law-Medicine Center of Western Reserve University where courses are offered throughout the year to attorneys, law students, physicians, medical students, law enforcement officials, etc. Fellows will be encouraged to participate actively in the teaching program.

Treatment of a Borderline Case with Group Analytically Oriented Psychotherapy*

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Borderline cases (2) (3) (4) (5) (6) exhibit reactions in their behavior, thinking and feeling which are very close to those of a schizophrenic. This results from impaired functioning of their ego, since they have suffered early and deep narcissistic wounds. Unlike the psychotic, they seldom have marked feelings of depersonalization and rarely show delusions or hallucinations, unless they are subjected to unusually heavy stress. Their problems, rather, reside more in the areas of integration, reality testing and planning, and in secondary process thinking. Their social adaptation is poorer than one would expect from persons of their ability. Failure to maintain object relationships is characteristic.

Some of these mechanisms and how they modify our theoretical concepts are illustrated in the case of a 33-year-old veteran who came to the clinic because of increasing nervousness and realization that without help he would be unable to "control himself." When we first saw this veteran in April, 1955, the examining psychologist submitted a statement describing this patient as a borderline paranoid schizophrenia. He was struck by the nature of the patient's complaints, of their bizarre quality both in ideational and perceptual fields. "There is a sense of liability rather than a rigidity of defenses as though the patient could manifest very bizarre behavior and quickly again recover without severe damage to his view of himself or his ego structure."

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* Presented at the 13th Annual Conference of the American Group Psychotherapy Association, New York, January 14, 1956.

On psychiatric examination, he complained of mounting anxiety. He was becoming restless and this coupled with his emotional unpredictability made him feel that he was losing his self control. His job as a sheet metal worker was threatened by the recurring impulse to resign, based on feelings of irritability and restlessness. Gambling threatened to ruin him financially.

His sexual adjustment was chaotic. He had recently been divorced from a "frustrating" woman twenty-two years his senior. During this marriage of approximately five years duration he had been arrested and hospitalized because of homosexual relations with an adolescent boy. Prior to coming to the clinic, he had just experienced sexual failure through impotence with a woman who was most attractive to him. Thus we recognize a libido fixation at a polymorphous stage of development, related to early childhood in which feelings of insecurity characterized by the promiscuous behavior of his mother and a lack of closeness to either parent dominated his home life. He related that his parents were never interested in him; they never asked him where he had been or what he was doing. By the time he reached early adolescence he had already indulged in frequent truancy from school.

His basic immaturity was of long-standing duration. He reported his feelings were easily hurt because of assumed rejection causing him to withdraw from people. His anger would get out of control without much provocation. During his adult life he frequently quit his job or would use the technique of going from one city to another in order to avoid facing the anxieties resulting from frustrations that are a part of every day experience.

At the age of seventeen he enlisted in the Army, serving five years. During his enlistment he lost control of himself and assaulted an officer. During this episode his consciousness was clouded. There are still gaps in his memory about it, with general vagueness about what actually occurred, although he was told he had chased the officer with a knife. In other words, when motor action was inhibited forcing him to tolerate tension of his own internal conflicts, he would "break with reality" rather than solve a problem in an inte-

grated manner. Acting out through such means as running away was not readily available to him and he simply resorted to explosive type of behavior.

Psychological testing during a subsequent upset period when he was hospitalized for having performed fellatio on an adolescent boy, showed a markedly disturbed personality. Anxiety and depression were almost of psychotic proportions. However, after a year of treatment in both group and individual therapy, at the age of twenty-nine, though far from being mature and stable, psychological tests and clinical examination revealed signs of ability to tolerate frustration and to regulate his impulses which heretofore had gotten him into so much trouble.

Effectiveness of treatment of the borderline cases has been strengthened by the knowledge that the main therapeutic task was not to overcome fixations but rather to leave them alone and concentrate on giving help toward improvement of ego function. Therefore, a supportive therapeutic attitude is recommended. Interpretations are limited, well defined as to time and space: concepts with which these patients have difficulty. Free association is avoided: preference for the sitting position is recommended.

The individual therapy of our patient (28 sessions) illustrates the value of the accepting attitude of the therapist, a woman whose age and mature understanding made it clear to him that he was being accepted. However, the problem presented by attempts to improve his tolerance of frustration without shattering his defenses was almost insurmountable. Both the therapist and the patient found it an overwhelming task to relate to each other. The patient would act like a ten-year-old boy. He fluctuated between having erections and being afraid that his therapy sessions were being observed through a mirror.

While the importance of individual interviews cannot be denied, it was clearly seen that except for his repeated experience of feeling rejected by the group it offered nevertheless the most important method for achieving progress for the following reasons. Therapy groups help the individual patient in developing his self esteem, and also responsibility

for his own behavior. Here he can find because of the multidimensional * possibilities for transference strong human support without over-permissiveness. Patients frequently give one another directions which would be smothering in an individual therapist-patient relationship. The therapy group may become, as was true with this patient, the only continuing contact with people.

Strengthening of the ego by identification with other patients is one of the most important mechanisms in group psychotherapy. This alone indicates advantages for the borderline patient. It offers a solution of the problem of what to do while waiting for the development of the mature ego, since identification lies on the road between narcissism and object relations. No other form of treatment gives such assistance in a problem area.

Whereas this patient was nearly overwhelmed by obsessive fears and feelings of weakness and was in general defensive about his lack of courage and masculinity, he now is learning how to connect childhood events with current group happenings. The mere witnessing of other members' freedom to verbalize their feelings without fear of punishment gives him courage which though borrowed from the others promises to be integrated into his own personality at a later date.

Fears of aggressive and affectionate feelings become diminished in the group. The behavior of others demonstrates to the borderline patient ways to channel such feelings. Our patient responded quickly to encouragement given by others to ventilate his strong emotional reactions toward both peer members and staff. He found the patient group leader (subleader) both engaging and anger provoking: heated exchanges took place between them. Nonetheless, they could join together in attacking the repressive concepts of other group members. He did not hesitate to express in suitable terms his seductive feelings toward the auxiliary (woman) group leader yet at the same time he could be acidly critical of her. He

* Resolution of the unreal aspects of the relationship to the therapist which has been described in the treatment of the borderline patient as always needing to be resolved through a "third person" (5) has the third person in the group whether in the person of another group member or of the "auxiliary therapist."

became adept in revealing his anger and fear of the male group leader by delineating this in terms of his own experience. He opposed dismissal of group members at the end of the session when they were still angry.

Groups frequently focus on ambivalent feelings toward current authorities. The leaders constitute the symbol of authority past and present. Problems related to their function assume dimensions of paramount importance very early in treatment. However, the conflicts raised by aim-inhibited impulses, both homosexual and heterosexual in nature, of all the group members, form the matrix of psychotherapy. The degree to which the group can demonstrate control of sexual impulses which has been facilitated through verbal expression indicates the progress it has made. This technique to the isolate, in general, and to the borderline patient, in particular, reveals fruitful meaning. As a result, feelings of despair and hopelessness are counteracted by the realization that others share them. Our patient described these feelings in vivid terms of his life experiences including his probation and its cause (he was still under probation for the arrest of a sexual offense with a minor). He sought advice from the group on deciding whether he should re-enter the hospital. He frequently discussed his struggle with suicidal thoughts.

After twenty-eight individual and twenty-nine group therapy sessions (given concurrently) psychological tests indicate a diagnostic impression suggestive of a "borderline state between a severe character disorder with dissociative episodes and a schizophrenia paranoid type." "In general, the changes might all be subsumed under the concept of repression. It would appear that the patient has been able to shore up his defenses to some extent and although still very disturbed is somewhat less so at the present time that he was six months ago."

Fancied or actual rejection by other group members poses the greatest difficulty in using this method of treatment for borderline patients. Our patient's two absences from the group followed episodes in which he felt angry toward or rejected by other group members. These patients frequently, as did our patient, suffer a masochistic desire which provokes them to recite material which almost always has the effect of

inciting criticism from other group members. This reaction they then interpret as rejection and utilize it to block progress in treatment. The group setting frequently limits the therapist by not allowing him the opportunity to correct the patient's misinterpretations.

Moreover, because of the group's need for its own cohesion, it encourages individual integration in its respective members. This results in a maximum interest in reality adjustment, particularly in the reality of the patient's adjustment to the group. It can be frequently of a striking nature. For example, patients who appear withdrawn in individual therapy where they spend the entire sessions discussing their delusions will oftentimes become in the group socially amenable and discuss areas of general interest.

Also, the group can be helpful in "weaning" the borderline patient from therapy. Not only do therapy groups have an inherent tendency to split up but also the group encourages the individual members to make adjustment in social groups and in the family. What has been learned in the therapy group can be applied in a salutary way to help the patient adjust to other groups.

Sensitive appreciation of the problems of the borderline patient becomes of utmost importance in the management of treatment. Care in selection of, and co-operation between, the individual and group therapists should be practiced. Progress is possible provided the therapist understands the nature of the multiple transference possibilities provided in group psychotherapy. He must also be aware of the uses of identification, of how such a patient's need for further ego development is threatened by the possibility of establishing object relations, but how it can be nurtured by identification with fellow group members.

The ease with which these patients experience rejection should prompt us to work out means for reducing this threat to their therapy. A clearer understanding of the conflict between masochistic tendencies, on the one hand, and reprisals, on the other, with the consequent entrapment of these patients in deeper feelings of rejection will provide new assurances for this method of treatment. Our acknowledged lack of skill in exposing to view the identification mechanisms

which presumably are so helpful to these patients presents an area for continued research.

Both from a theoretical point of view and from the experience gained from observing this one patient, the primary task of this clinic will be to make allowance for this diagnostic category. And then, through experimentation in groups of differing composition we should find out where these patients make the best adjustment, limited as that will probably be. In the group situation, it is easier to accept the more limited goals of amelioration of symptoms as well as to sustain with some degree of equanimity the inevitable failures that arise. A small number of cures can thus be more readily accepted and may even be more likely when the therapist puts less pressure on both himself and his patient to produce "results." The necessity for modifying therapeutic expectations challenges the counter-transference reactions of the most experienced therapist in these cases.

Conclusion

The difficulty that these patients have in relating to others poses an almost insuperable problem in individual psychotherapy. Not only are there great barriers in relationship to the transference problems but the counter-transference problems that they raise in the therapist have made the individual therapy of these patients very trying. Group therapy with these patients, on the other hand, has to overcome their great sensitivity to the feeling of being rejected by other patients in the group. This is particularly true when there are other patients in the group of a hostile and sadistic character.

However, when both group and individual therapy are given concurrently to these patients and when there is care in the selection of and co-operation between the individual and group therapist, progress becomes possible. Further research in separating this category of patients is recommended and it would be well to experiment with evaluation of how these patients can be handled in groups of different compositions but it does appear entirely possible that the combination of group and individual therapy may become the treatment of choice for the borderline patient.

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Seminar in Forensic Pathology*

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Case 5. Alleged Aggravation of Cancer by Trauma

This 63-year-old man sustained a crushing injury of the chest when he was caught between a cart and a wall while at work on November 4, 1949. On admission to the hospital, he had fractures of the left 5th, 6th, 7th, 8th, 9th and 10th ribs. He was treated by a splinting of the chest and thoracentesis. Three weeks after injury a second X-ray revealed a density in the left upper pulmonary lobe. Review of the earlier X-ray showed a suggestion of the same density but probably concealed by the hemothorax incident to the injury. The mass was thought to be an encapsulated hematoma following the injuries and he was discharged home for follow-up. Subsequently, the mass appeared to increase in size and the chest was explored on April 11, 1950. Figure 1 is an X-ray taken March 30, 1950. The surgeon found an area of scarring and retraction on the surface of the left upper lobe, biopsy of which was reported as positive for tumor on frozen section. A tumor mass was extirpated from the upper left lobe but not even a lobectomy was done in view of the apparent spread to the pleura. On July 25, 1952 an X-ray showed fibrosis in the lung—no tumor. The patient filed suit for compensation for the entire disability as the result of his injury and, based on the circumstances and the testimony of the surgeon that the injury may have delayed the diagnosis of cancer and therefore contributed to the disability, compensation was awarded. He was never able to return to work but continued to draw compensation and on March 14, 1953 was

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readmitted to the hospital with a history of having become stuporous and then comatose at home. He survived approximately two weeks in the hospital during which time he showed a right hemiplegia and developed a bronchopneumonia. Final hospital diagnoses at the time of death were cerebral hemorrhage with hemiplegia, terminal bronchopneumonia, possible metastatic carcinoma of the brain. An autopsy

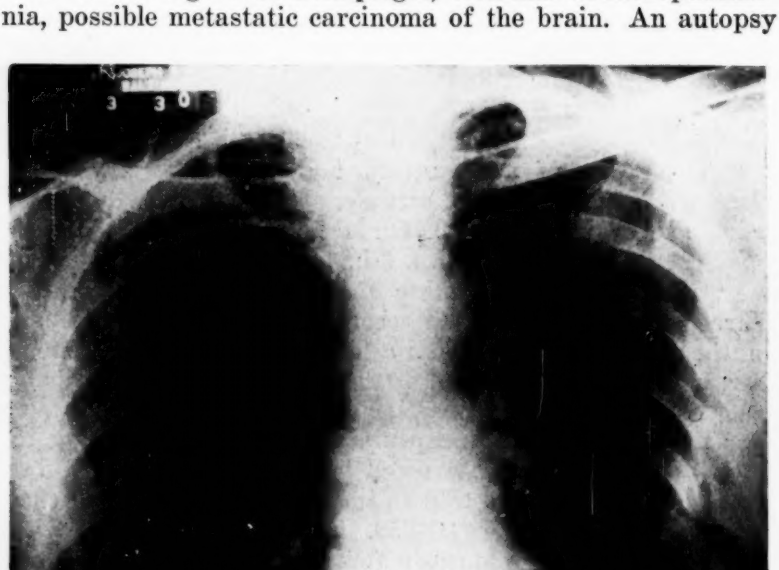

Fig. 1—X-ray of chest showing density in left upper lobe later shown to be a carcinoma.

was not performed until the compensation carrier asserted his rights upon being sued for the death benefit due to an industrial accident. The body was disinterred on April 4, 1953. The autopsy showed the brain to be embalmed in good condition. There was mild cerebral arteriosclerosis. At the oral half of the right temporal lobe there were old cystic and slightly brown discolored areas. In the left cerebral hemisphere there was a larger softening containing some dark stained areas. A smaller softening was found in the left

cerebellar hemisphere. The heart showed advanced coronary sclerosis with calcified changes in the vessel walls. The left anterior descending coronary artery was totally occluded by a brownish hemorrhagic discoloration in the wall for a distance of an inch, starting an inch from its origin. The myocardium showed old fibrous scarring involving the anteroseptal left ventricle and the apex of the heart. There was marked

Fig. 2—Photomicrograph of the tumor in the left upper lobe showing extensive necrosis of neoplastic elements.

thinning of the muscle, and clinging to the endocardium there were multiple gray brown thrombi extending between the trabecula carnae. The lungs showed a confluent bronchopneumonia, scarring over the pleural surface of the left upper lobe and multiple artefacts of embalming but no evidence of any lung neoplasm. Figures 2 and 3 are photomicrographs of the lung tissue. Figure 4 is the cut section of the lung at autopsy; Figure 5 shows a section of the cerebral softening and some recent mural thrombi overlying a scar

in the left ventricle. Figure 6 demonstrates the cystic lesions in the right cerebral hemisphere. Two histologic slides of the brain were selected for the seminar, one from the softening (Figure 5) and one from the lesions in the right temporal lobe (Figure 6). Figure 7 is a low power photomicrograph of two of the latter lesions.

The Medicolegal Problem: (1) What is the age of the lesions in the brain and what is their etiology? (2) How will

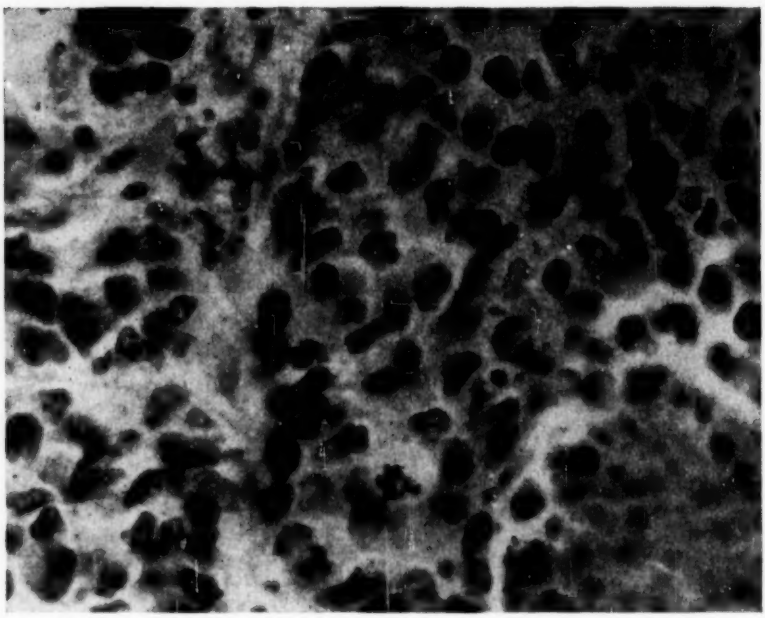

Fig. 3—Photomierograph of neoplastic cells in the lung tumor.

you testify in the compensation hearing regarding death benefits?

Discussion: (1) The softening showed grossly and microscopically, the characteristics of late organization (Supplement I). Within the lesion there were innumerable gitter cells but no signs of active phagocytosis. In some areas of the former gray matter, and in the subarachnoid space there was accumulation of iron pigment indicating that the soften-

ing had been a hemorrhagic one. One arterial branch was occluded by a thrombus showing recanalization. Some portions of the former cortex, of the former white matter and of the former striate body were in the state of coagulative necrosis (Supplement I). The border of the survived marginal tissue was distinctly visible in most areas and covered with a thin connective tissue membrane resembling the pia. Glial

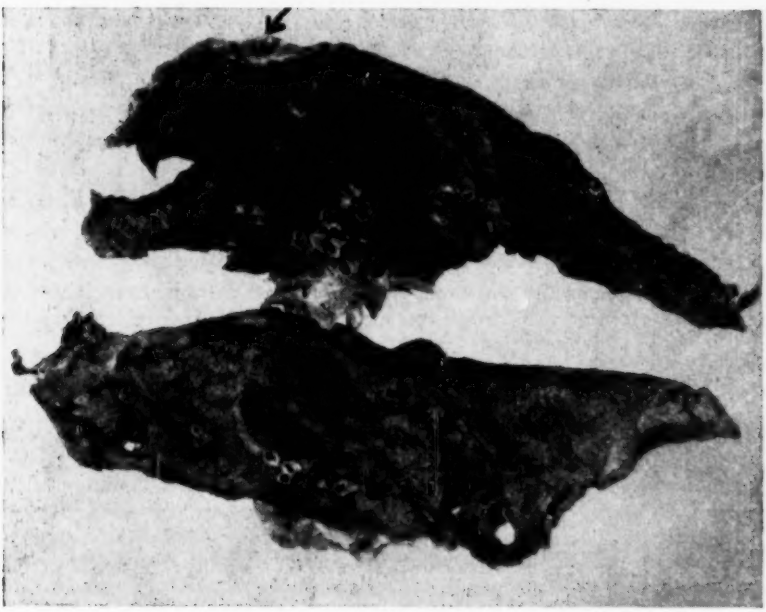

Fig. 4—Cut sections of left lung at autopsy. The arrow shows the scar where the tumor was extirpated. The multiple holes are artefacts of embalming.

proliferation within the marginal tissue had come to a standstill. The gross and histologic characteristics of the lesion indicated that it was approximately 4 to 6 months old. It was responsible for the right hemiplegia which, therefore, must have been present several months before the last admission. Since the heart showed multiple old infarcts and old and fresh mural thrombi, whereas the cerebral arteries revealed only mild arteriosclerosis, the softening was most likely caused by an embolus from an intracardial mural thrombus.

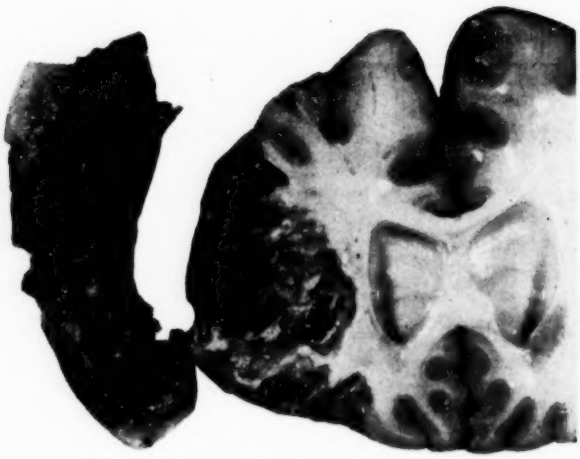

Fig. 5—Section through left ventricle of the heart showing old scars and old and fresh mural thrombi near the apex. Cross section through rostral portion of softening in left cerebral hemisphere. Whitish areas within the softening are due to coagulative necrosis.

Fig. 6—Old cystic trench-like contusion foci at the crest of the second and third convolutions of the right temporal lobe.

The lesions in the right temporal area (Figure 6) are not vascular but traumatic in nature. They show the typical characteristics of old cortical contusions: the location at the crests of the convolutions, the wedge-like shape on cross section (Figure 7), the open communication of the cystic defect with the subarachnoid space because of the destruction of the first cortical layer over its center, the presence of stump-like remainders of this layer (arrows in Figure 7), and the relatively straight borders. An iron stain revealed, as it usually does in such cases, some storage of iron in the glia of the marginal tissue, especially of the remainder of the first

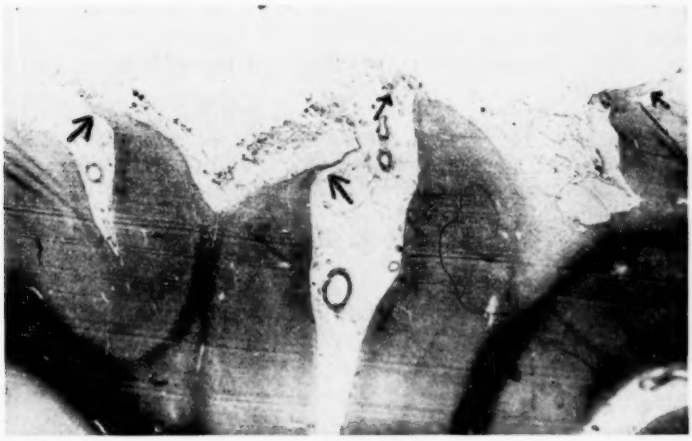

Fig. 7—Photomicrograph of two adjacent old contusion foci located at the crest of the convolutions. The arrows point to the remainders of the first cortical layer. Myelin sheath stain. X 6.

cortical layer and incrustation of dead nerve cells with iron (4). Such old cortical contusions were formerly believed to be caused by arteriosclerosis and were called "etat vermoulu" (Pierre Marie). Spatz (5), however, demonstrated that they are the results of mechanical injury. He and others believe that the contusion necrosis is caused by mechanical forces. Therefore, the first cortical layer, usually preserved over vascular softenings, is always destroyed over the center of cortical contusions. As to the age of the contusion foci, their gross and histologic appearance suggested that they were at

least 1 to 2 years old. Their shape and location suggest that they were contrecoup lesions. Therefore, one may assume that the patient received them in a fall and that the site of impact was the left side of his head. For further information on brain lesions in head trauma due to blunt forces see Supplement II.

(2) The remainder of the autopsy showed no evidence of the cancer which had been demonstrated at the operation on April 11, 1950. In regard to the testimony at the compensation hearing, of course, it was testified that the injury had nothing to do with the death.

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Supplement I

TYPES OF NECROSES DUE TO OXYGEN DEFICIENCY IN THE CENTRAL NERVOUS SYSTEM

A. Factors Determining the Degree of Tissue Necrosis:
   1. Rate of oxygen deficiency, e. g., its intensity plotted against time.
   2. Difference in sensitivity of various cell types to depletion of oxygen.
      Order of Sensitivity: a. ganglion cells; b. oligodendroglia; c. astrocytes; d. microglia or mesoglia (Hortega); e. perivascular connective tissue.

3. Adaptability of the various cell types to subacute oxygen deficiency.

B. Morphologic Manifestations of Different Degrees of Tissue Necrosis:

The following types of necroses may occur solely or in any combination in one and the same lesion.

I. Complete Necrosis—resulting in discontinuity or defect of tissue:

a. Coagulative Necrosis. All tissue elements including connective tissue become necrotic.

Attempt of organization usually occurs only in the periphery of the lesion (sequestration). No foreign body reaction, no connective tissue scar. Necrotic tissue remains unchanged as firm whitish mass for years. Outlines of cells and myelin sheaths are faintly visible even after months (H & E stain).

b. Colliquative Necrosis—known as softening or encephalomalacia. If a softening involves the entire supply area of an obstructed artery, it is called a "total softening"; if it is restricted to a part of the supply area, e. g., cortex, it is called a "partial softening." The tissue within a softening undergoes changes which may be subdivided in 3 phases.

1. Phase of necrosis: lasting 6 to 10 days.

a. Grossly: Swelling lasting 6 to 10 days, soft consistency. Demarcation of focus noticeable after 24 to 48 hours. If hemorrhagic, hemorrhages are confined to gray matter, are of secondary diapedetic nature and very seldom coalesce to large hemorrhages.

b. Microscopically: Vacuolization, liquefaction or "acute shrinkage" (not "sclerosis") of ganglion cells and loss of staining properties within 2 to 6 hours. Nuclei of ganglion cells triangular, pyknotic. Possibly local diapedesis of red cells, of white cells or of plasma-serum (not mass invasion of leukocytes throughout the focus). After 6 to 18 hours "ischemic" ganglion cell alteration with incrustation of pericellular structures; karyorrhexis of glial nuclei; clasmatodendrosis of astrocytes. After 24 hours first mesoglial "gitter cells." After 2 days, beginning reaction of survived connective tissue and mesoglia within focus and of marginal astrocytes in outer zone of first layer of necrotic cortex and ventricle wall, respectively. After 4 to 6 days, mass produc-

tion of phagocytes by connective tissue and mesoglial cells. Marked progressive reaction of astrocytes in perifocal zone, first layer of cortex and subependymal layer of ventricle wall usually staying intact.

Gradual transition of phase 1 into .....

2. Phase of organization:

a. Grossly: Swelling disappears. Necrotic tissue becomes friable, dissolves gradually.

b. Microscopically: Masses of gitter cells. Remnants of necrotic tissue in state of dissolution. The peak of gitter cell production is usually after 2 to 4 weeks, decreasing slowly. Gitter cells undergo lysis, few are slowly removed through adventitial spaces of adjacent vessels. Gitter cells containing iron pigment survive longest. Formation of accessory piaglia-membrane along wall of defect. Organization and removal of dead tissue occur faster and more complete in infant brains.

Gradual transition of phase 2 into .....

3. End phase—or cystic phase:

a. Grossly: Defect with sharply defined wall, traversed by spiderweb network of remnants of former vascular apparatus and containing clear fluid. In infant brains: smooth-walled cysts containing no or little network (porencephaly).

b. Microscopically: No connective tissue scar in surrounding tissue, but varying degree of glial scarring partially due to secondary degeneration of nerve fibers. Within focus, only a few gitter cells left. In vessels of network circulation may be restored.

II. Incomplete Necrosis:

Ganglion cells, to various extent oligodendroglia and possibly some astrocytes degenerate subacutely or chronically. At the same time surviving astrocytes and mesoglia show various degrees of progressive reaction. Occasionally, neuronophagia. Gitter cells uncommon. Perivascular connective tissue reacts only slightly or not at all. Unnoticeable transition from astrocytic reaction to glial scar (Holzer method for staining glial fibers). Terminal phase: atrophy or sclerosis.

Supplement II

GENERAL REMARKS ON BRAIN LESIONS IN HEAD TRAUMA DUE TO BLUNT FORCE

I. Primary Lesions:

These lesions are mechanically induced by pressure, shearing and tearing forces. Hemorrhages originate at the moment of impact due to tearing of the vessels and may enlarge during survival time. Necroses are caused by physical damage of the protoplasm and become grossly visible after one or two days.

Cortical contusion foci are a typical example of traumatic necrosis. They are located at the crest of the convolutions and are usually wedge shaped. Their outlines do not coincide with vascular supply areas. In contrast to small cortical softenings caused by anoxia, the first layer of the cortex is invariably destroyed over the center of the lesion. The phases of a lesion (necrosis, organization and resorption, cystic defect) are similar to those of a softening.

Larger arteries may suffer acute tears or subacute degeneration of their walls resulting in large massive hemorrhages similar to those seen in hypertensive cardiovascular disease or in aneurysms of basal arteries bleeding into the brain substance. In order to clarify the true nature of a large hemorrhage it is necessary to evaluate and co-ordinate all findings, especially as to their topographical characteristics. Subarachnoid hemorrhages are the most frequent ones. They may be the sole sequela of the trauma. The majority of traumatic lesions in the brain are due to contrecoup.

Certain parts of the brain are predilection areas of the contrecoup lesions.

A. Cerebral Cortex: Order of frequency of occurrence:
   1. Frontal pole and lower surface of frontal lobe (orbital lobe).
   2. Temporal pole and 1st, 2nd, and 3rd temporal convolutions.

3. Posterior orbital cortex and cortex of internal temporal pole facing wing of sphenoid bone.
4. Uncus of hippocampal gyrus or any part of this gyrus opposite to the tentorial edge.
5. Paramedial cortex underlying pacchionian granulations (first frontal convolution, etc.).
6. Gyrus cinguli opposite to edge of falx.
7. Lower half of central convolutions.
8. Lower surface of temporal lobes.
9. Parietal and occipital lobes.

B. Cerebellar Cortex:
1. Lower surface of both cerebellar hemispheres.
2. Lobuli facing falx of cerebellum.
3. Lobuli facing tentorial edge.

C. White Matter:
1. Any white matter area adjacent to cortical foci; the lesions invariably constitute hemorrhages, often following long veins.
2. Corpus callosum.
3. Cerebellar white matter near dentate nuclei.

D. Brain Stem and Basal Ganglia:
1. Lateral portion of lower midbrain and upper pons; hemorrhages are caused by tentorium.
2. Posterior hypothalamus and area around aqueduct.
3. Dorsal thalami and dorsal caudate nuclei; lesions are usually associated with foci in corpus callosum and fornices.
4. Area of thalamus near geniculate bodies.
5. Brachia conjunctiva.
6. Pons and medulla oblongata (lesions should not be confused with secondary midbrain and pons hemorrhages).

Lesions beneath the area of impact (coup lesions) and those due to skull fracture without laceration of the dura, show essentially the same characteristics as contrecoup lesions. As long as the dura remains intact the injury is a closed one. A laceration of the dura indicates that it is an open injury.

Therefore, lesions caused by bone fragments or other foreign objects are called open brain wounds and not contusions.

Extent and location of the lesions depend, among others, on the position of the head at the moment of the trauma.

(1) If the head is in motion (fall on the head) contrecoup foci are usually more extensive than the lesions beneath the impact area. The latter are often absent.

(2) If the head is movable but not in motion (blow by an object), the lesions are usually limited to the site of the impact.

(3) If the head is supported (wheel of an automobile running over the head) true contusion foci seem to be rare. Lesions mostly constitute open brain wounds caused by bone fragments.

The presence of a skull fracture does not necessarily indicate the severity of an injury. The fracturing of the skull absorbs some of the energy of the impact. Thus, there may be an extensive skull fracture but surprisingly little damage of the brain. Most severe brain injury may be found without skull fracture.

II. Secondary Lesions:

These lesions are just as important for clinical and pathologic aspects as the primary lesions. They may be predominant and often constitute the immediate cause of death.

(1) Almost every case of blunt head trauma is complicated by acute or subacute increased intracranial pressure due to hemorrhages, necroses and brain edema. This increased pressure is often the cause of secondary lesions. Swelling of both cerebral hemispheres causes compression of third ventricle and ischemia of vital areas surrounding it. This may account for dysfunctions of the autonomic regulatory centers which result in death. Severe compression of sulci may lead to cortical necroses along the deeper portions of the sulci (especially in children).

Shifting of one hemisphere towards the opposite side (epi- or subdural hematoma) may lead to local pressure by the edge of the falx, on vessels and brain tissue with subsequent localized necrosis of gyrus cinguli and even more extensive necroses in supply areas of compressed branches of anterior cerebral artery. Pressure of the brain against the edge of

the tentorium often causes local necroses in gyri hippocampi opposite to the edge and compression of branches of the posterior cerebral arteries with subsequent larger softenings of cortex including Ammon's horn and sometimes of white matter, too.

Compression of vessels within the interpeduncular fossa leads to ischemia in thalami, posterior hypothalamus, midbrain and upper pons resulting in edema, necroses and diapedetic hemorrhages. The latter often coalesce to larger hemorrhages which in midbrain and upper pons characteristically start in the midline in contrast to primary lesions occurring in the lateral portions (contusion foci caused by tentorial edge). Decerebrate rigidity and respiratory failure are clinical manifestations of damage to midbrain and adjacent areas.

Branches of superior cerebellar arteries may be compressed by the tentorial edge with subsequent necroses in their supply areas. Herniation of cerebellar tonsils—a relatively rare occurrence—may result in necrosis of incarcerated lobuli.

(2) If the trauma was accompanied by severe shock, a rather diffuse damage of ganglion cells may develop in cerebral and cerebellar cortex as well as in basal ganglia.

(3) Thrombosis of injured arteries and veins may cause all types of necroses in the respective supply and drainage areas.

Case 6. The Survival Period After a Wound

This 20-year-old man was found dead in his beach cabin with a stab wound of the chest which penetrated the pericardium and cut the left ventricle but did not open the cavity. There was massive hemopericardium. The autopsy showed nothing significant beyond these injuries. The police developed the information that the decedent's cabin was the scene of repeated drunken brawls and they arrested a suspect who left the cabin approximately 36 hours before the body was discovered. They also had information indicating that an unidentified couple visited the cabin twelve hours before the body was discovered but stayed only a few minutes. When the body was found, rigor and livor were fully developed and body heat was absent. It was in February and the weather was cold. There was no fire in the stove in the cabin. It is of

paramount importance to the police to determine "when he was killed."

The Medicolegal Problems: (1) Approximately when did death occur in relation to the time the body was discovered? (2) Which of the two groups of "visitors" to the cabin does the evidence seem to incriminate?

Discussion: (1) Microscopic study of the heart and the wound tract through the chest wall leading to it showed an extensive granulocytic infiltrate in the tissues adjacent to the wound. There was chromatolysis and nuclear fragmentation

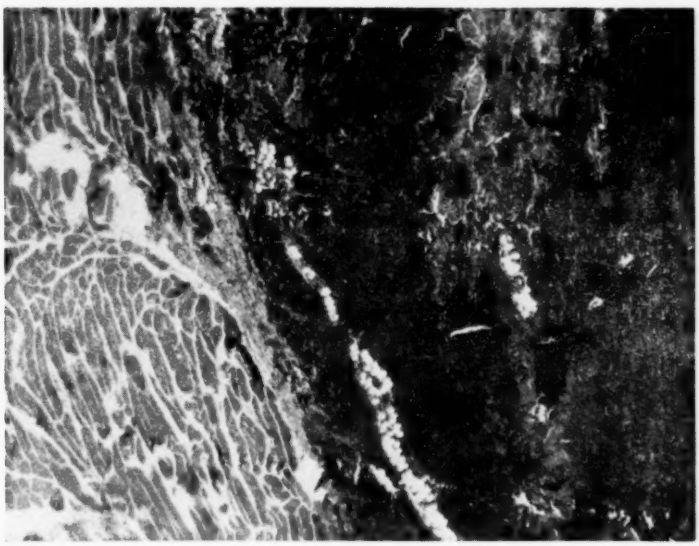

Fig. 1—Extensive hemorrhagic infiltration in epicardial fat adjacent to the stab wound.

of many of the granulocytes. Moderate numbers of lymphocytes and occasional plasma cells and some mononuclear phagocytes were present in some areas of the exudate. Figure 1 shows the epicardial hemorrhage adjacent to the wound in the heart muscle. Within this epicardial fat, there were occasional phagocytes showing tiny amounts of hemosiderin and, here and there, in perivascular locations, one could find swollen, elongated fibroblastic nuclei with the earliest signs of

collagen deposition within the cytoplasm. Figure 2 shows such an area. Its evaluation is to be made in terms of the sequence of events in incised wounds. In describing such a sequence, it must be emphasized that one can only postulate minima in stating the interval since a given injury was sustained, since shock, dehydration, extensive cooling of the body, malnutrition and many other factors retard the rate at which the inflammatory process progresses. A simple example of the same phenomenon is seen in nature where an investi-

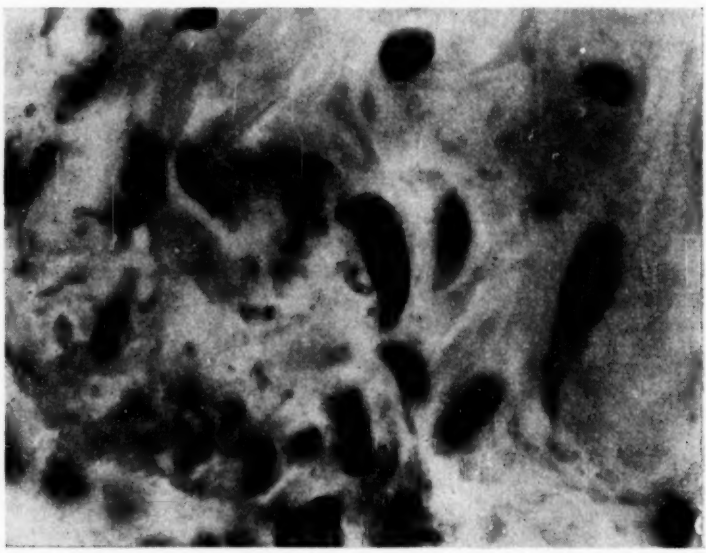

Fig. 2—High magnification of a section of figure 1 showing perivascular fibroblastic and endothelial swelling indicating inflammation at least 18 to 24 hours in duration.

gator, knowing that the maximum rate of growth of a given type of grass seed, under optimal conditions of temperature, fertilization, moisture and sunlight is capable of producing a blade of grass 2 inches long in a 4-day period. Attempts to evaluate when a given field of grass was planted, based on the finding of blades 2 inches long, can only state that the grass was planted at least 4 days before; whereas, in fact, it may have been planted 2 weeks before and, due to poor envi-

ronment, may have been slow to germinate and grow, producing a 2-inch blade only after 2 weeks. Failure to recognize that the phenomena of inflammation are influenced by multiple factors in the human frequently leads to conclusions that a given wound has been more recently sustained than is the actual case. In general, it may be stated that hemorrhage in the neighborhood of injured vessels, particularly if limited in nature, can be sustained for several hours after death if the tissue is manipulated or the portion of the body wherein the hemorrhage is observed is dependent during the early postmortem interval. True margination and emigration of leukocytes may even occur in wounds sustained in a few minutes after somatic death. In general, however, the presence of bona fide margination and emigration of granulocytic leukocytes are not seen in wounds sustained less than 15 minutes before death. In the period from 15 minutes to one hour, margination and emigration of leukocytes along with simple hemorrhage and fibrin exudation are the only vital processes observed. This process continues in subsequent hours and, according to Higgins and Palmer (6), the earliest degeneration of the polymorphonuclear leukocytic nuclei can be observed between 3 and 5 hours. The appearance of lymphocytes in significant numbers is not seen until 8 to 12 hours and, according to Maximow (7), migrating monocytes do not appear until 12 to 24 hours. Other findings indicating the wound to be 12 to 24 hours in duration are the presence of proliferative changes in the vascular endothelium, mitotic division of fibroblasts and, more commonly, the swelling and elongation of fibroblastic nuclei with the earliest signs of deposition of tiny amounts of collagen within the cytoplasm at the tips of the fibroblasts. The appearance of hemosiderin in macrophages does not seem to occur in less than about 18 hours and the presence of more than minimal amounts of iron positive pigment can be accepted as proving a minimum age of one day since the injury. Higgins and Palmer (6) state that the granulocyte nuclei are, for the most part, fragmented by 21 hours and by 30 hours the basophilic fragments are autolyzed or engulfed by phagocytes. The fibroblasts would have begun to swell in the late hours of the first day, increase in number and prominence during the second 24 hours and,

by the end of the second day, definite sprouting of capillary network with the arrangement of fibroblasts at right angles to the vessels, is readily recognized in wounds showing maximal inflammatory response. In the third to the fifth day, some of the new formed vessels began to show thickening and obliteration and solid sheets of collagenous tissue may be deposited with shrinkage of the fibroblastic nuclei. The occurrence of secondary infection of tissue, necrosis, recurrence of hemorrhage and recrudescence of the inflammatory process will frequently produce foci appearing much younger than the injury and one must, therefore, search thoroughly for the oldest reaction in evaluating the age of the wound.

The medicolegal investigator frequently is confronted by the police investigator with the question "when did the victim die"? The inexperienced pathologist, taking into account the development of rigor and livor and loss of body heat, may reach an estimate of post-mortem interval and, deducting this from the time the body is viewed, render a reasonably accurate answer to the police of time of death. The police investigator, not realizing that the pathologist is evaluating the occurrence of somatic death, will frequently not further question the pathologist about delay between injury and death; hence, his investigation may be started with the assumption that the time of fatal assault and death were synonymous, whereas, in fact, minutes to many hours or days may elapse between the fatal assault and the death. The pathologist who fails to apprize the detective of his estimate of delay between assault and death, as well as the post-mortem interval, may well lead the detective on a useless wild goose chase. The responsibility must rest with the pathologist for answering the question "when did the fatal assault occur" rather than "when did he die"? For, in truth, it is the former question with which the police investigator is concerned in evaluating the opportunity of a given suspect to have committed the crime or vice versa, establish an adequate alibi.

(1) Our evaluation of time elements in this case was that the body, being cooled and having full rigor and livor, had been dead at least 6 hours while the microscopic pathologic picture indicated death from 12 to 18 hours or more after an injury.

(2) It is at once apparent that the unidentified couple who visited the cabin 12 hours before the body was found could be discharged as suspects. Further investigation confirmed the suspicion that the suspect who had left the cabin 36 hours before the body was discovered had done so after being involved in an altercation with the decedent during the course of which the suspect stabbed his "drunken friend."

Case 7. The Non-Specificity of Centrolobular Necrosis in the Liver

This 38-year-old man was admitted to the hospital after being found collapsed in a semi-comatose condition on the street. He was known to the police as a chronic alcoholic for the past 20 years. In addition, he was known to have had pulmonary tuberculosis with a six months' sanitarium stay three years ago. The decedent's "girl friend" stated he had been vomiting for several days with particularly constant vomiting during the last day. Upon admission to the hospital, the NPN was 142 mg. %. He was slightly icteric and in shock. The chest showed signs of bilateral patchy pneumonitis on physical examination and X-ray. He died six hours after admission. The post-mortem examination showed a slightly icteric, thin man. The heart was flabby but otherwise unremarkable. The right lung weighed 1250 grams, the left lung weighed 840 grams. There was a diffuse patchy gray-brown staining of the tissue with focal consolidation in a lobular pattern throughout and in addition, the upper lobes showed focal caseous consolidation with the largest focus one-half inch in diameter. The liver weighed 1990 grams and the cut section showed a uniform accentuation of the peripheral zone of the lobule while the central zone was retracted and dark brown in color. The gall bladder was distended with a dark bile; the external biliary tree was normal. The kidneys weighed a total of 730 grams. Cut section showed marked swelling of the parenchyma with radiating brown striations in the medullae and dark brownish discoloration of the cortico-medullary junction with marked pale yellow discoloration of the swollen cortex. Microscopically the upper pulmonary lobe showed an active tuberculosis process while the remainder of the lung showed an aspiration pneumonia. Fig-

ures 1 and 2 are a low power and medium magnification of the liver showing the extensive centrolobular necrosis with a scanty fatty infiltration and practically no leukocytic reaction or regeneration in the necrotic central zones. Figure 3 shows the kidney with extensive tubular obstruction by hemoglobin casts. Other areas showed the classical features of a lower nephron nephrosis.

The Medicolegal Problems: (1) What was the diagnosis? (2) What was the etiologic agent? (3) How specific can you be in regard to the latter?

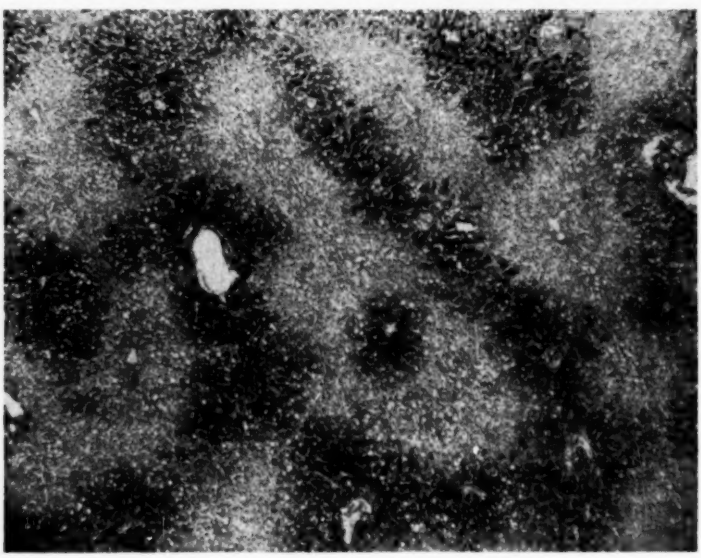

Fig. 1—Low magnification of liver showing extensive central necrosis.

Discussion: (1) The cause of this man's death was uremia due to a lower nephron nephrosis associated with a severe central necrosis of the liver. The absence of inflammatory reaction in the liver and the exclusively central distribution of the lesion pointed strongly to a hepatoxic agent as the cause of damage rather than a primary hepatitis.

(2) The etiologic agent in this case was not carbon tetrachloride as most pathologists suspected but a combination of various "alcoholic beverages" imbibed by this man in a period of twelve days before his death. These included beer, whiskey,

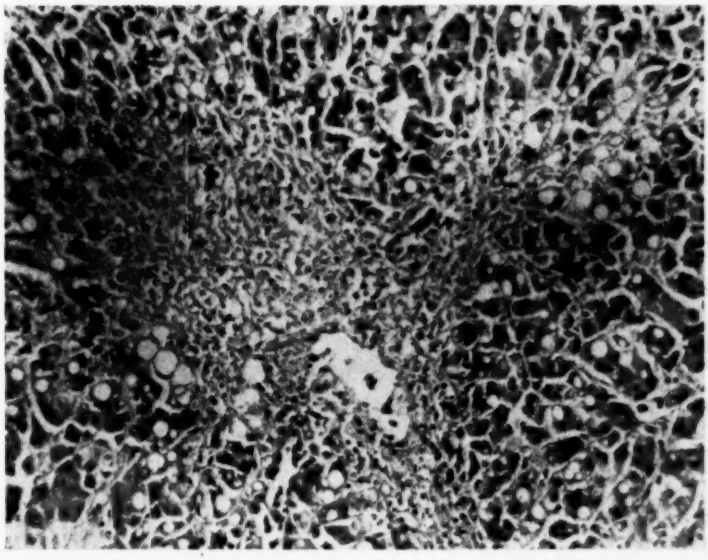

Fig. 2—Intermediate magnification showing a necrotic centrolobular area. Note the absence of regeneration or of significant leukocytic reaction.

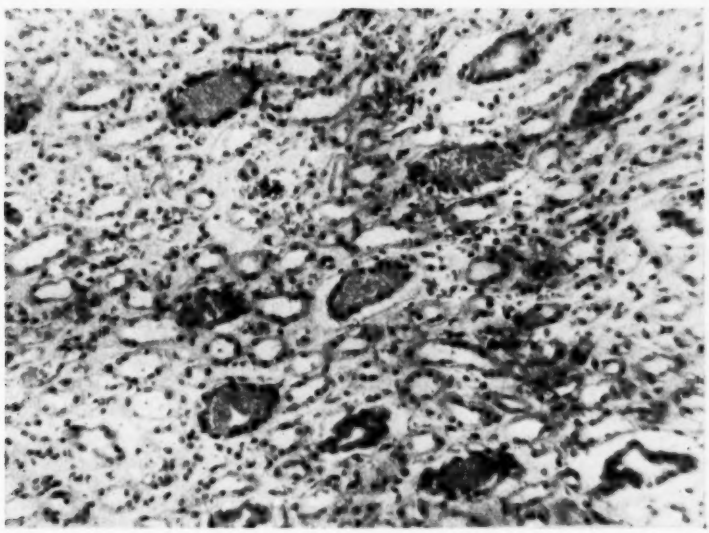

Fig. 3—Intermediate magnification of renal tubules deep in the cortex showing obstruction by "hemoglobin" casts.

6 or 8 oz. of Mennen's shaving lotion, 4 oz. Eau de Cologne, approximately ½ of a 4 oz. bottle of Listerine and an indeterminate, but small quantity of Kreml hair tonic.

(3) Obviously the degree of specificity of the tissue response, even when of the nature of central necrosis of the liver coupled with lower nephron disease is of very low order. The case was presented to emphasize the difficulties in diagnosing the cases where a toxic agent is suspected as a result of the pathologic findings. There are many published cases of "carbon tetrachloride" poisoning in which the evidence to indict the carbon tetrachloride is inadequate and exposure to other agents similar to those responsible for the death in this case was not ruled out.

Case 8. Myocardial Infarction Due to Contusion

This 70-year-old woman was admitted to the hospital with fractures of both wrists and possible fractures of the ribs shortly after the car in which she was riding collided with a truck. She was a passenger in the front seat. She survived 52 hours. The clinical impression was massive collapse of the lung. It was known that she suffered from hypertensive cardiovascular disease and had sustained at least one bout of myocardial insufficiency. The terminal event was a sudden episode of cardiac irregularity and marked dyspnea. The post-mortem examination showed an obese elderly woman. There were fractures of the first ten ribs on the left and the 3rd, 4th, 5th and 6th on the right in the anterior axillary line and of the sternum at the fourth interspace. The left lung was collapsed and atelectatic. The heart weighed 640 grams. There were peculiar hemorrhagic areas on the anterior surface of the right atrium and lateral surface of the left atrium. The coronary arteries were large thin-walled vessels with no evidence of occlusion. There was myocardial hypertrophy of the left ventricle. The liver showed a moderately severe portal cirrhosis. There was a tear in the capsule of the spleen and localized perispleenic hemorrhage in the left upper abdominal cavity. This, however, was well contained and

there was no evidence of terminal bleeding. The kidneys showed fine granular surfaces with some thinning of the cortex. Microscopic sections of a focus of hemorrhage and necrosis in the atrialmyocardium are shown in Figures 1 and 2. There was subepicardial hemorrhage and extension of the process well down into the myocardium with a well-developed granulocytic exudate and necrosis of muscle fibers.

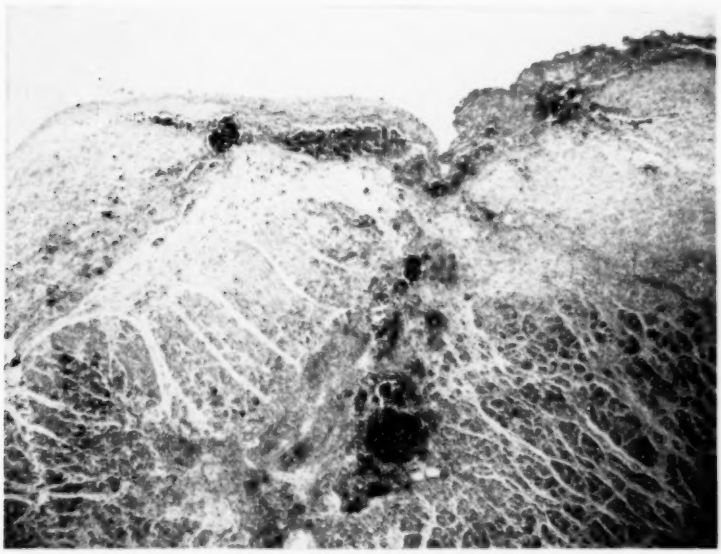

Fig. 1—Photomicrograph at low magnification of subepicardial and myocardial contusion and hemorrhage due to steering wheel injury.

The Medicolegal Problems: (1) What was the diagnosis? (2) What is your opinion in regard to the causal relationship between the automobile accident and this woman's death?

Discussion: (1) The diagnosis is myocardial contusion. The findings are those frequently seen in the hearts of people who have sustained steering wheel or other crushing injuries of the chest. The disease is sometimes impossible to differentiate, on the basis of the myocardial lesion alone, from infarction due to circulatory interference.

(2) Since this patient presented the classical findings of crushing injuries of the chest with fractures of the ribs on

both sides and a fracture of the sternum and lesions in the myocardium on the anterior aspect of the heart, in the absence of significant coronary disease, it was apparent that the pathologic findings were due to trauma. These findings, coupled with the clinical evidence that the terminal event was a cardiac irregularity, led to the opinion that the death was a direct, although delayed, result of crushing injury of the chest.

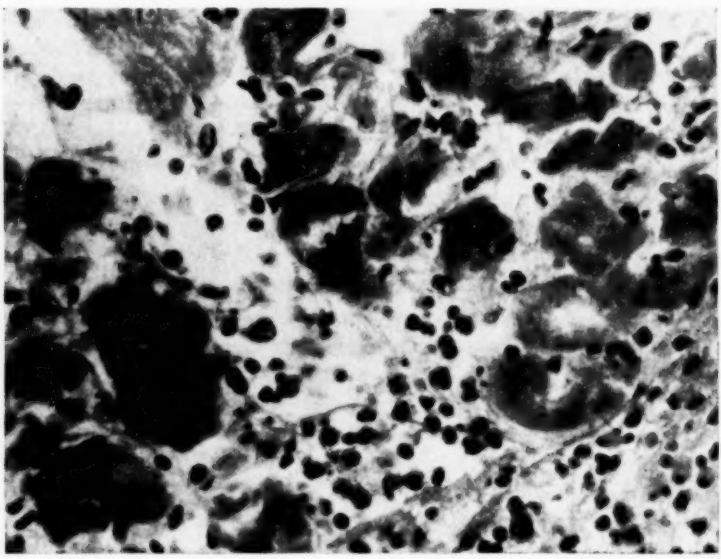

Fig. 2—Photomicrograph at high magnification showing inflammatory reaction and necrotic muscle fibers. The area shown is from the lower central portion of the gross contusion shown in Figure 1.

Case 9. Cerebral Fat Embolism

This fifty-eight-year-old man, a pedestrian, was struck by a car 18 days prior to his death. He suffered a severe bumper fracture of both lower legs and an abrasion over the back of his head. On admission, he was incoherent and confused. X-rays of the skull, cervical spine, and ribs revealed no fractures. His blood pressure was 230/110 and his pulse 76. The legs were set and put in plaster. He never regained full consciousness after the operation. His temperature was always

elevated, sometimes rising to 104.5° F. A spinal puncture seven days after the accident revealed pressure of 220 mm. H_2O and bloody xanthochromic fluid. He gradually developed uremia and eventually died of pneumonia. The final diagnosis was: compound fracture of right lower leg, comminuted fracture of left tibia and fibula, severe cerebral contusion with probable laceration of the brain, bilateral terminal pneumonia.

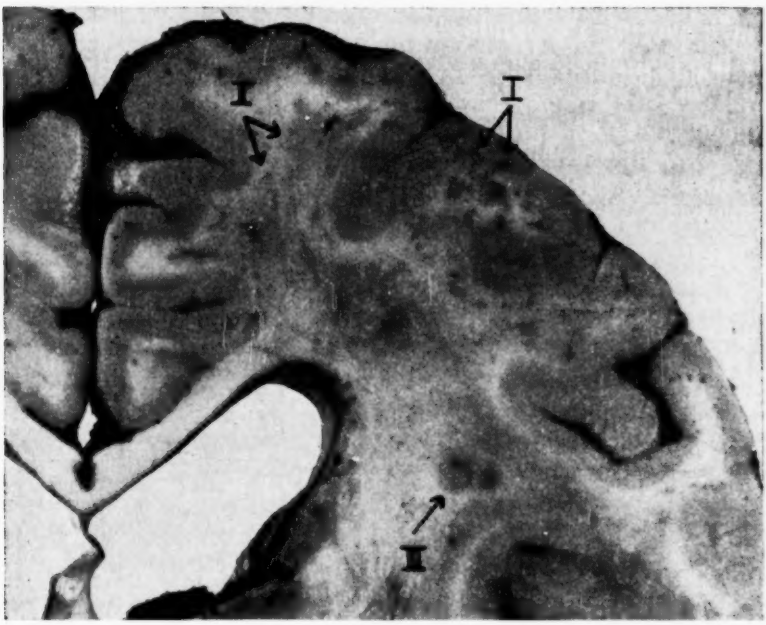

Fig. 1—Multiple, very small petechial hemorrhages of different age (arrow I) and small irregularly shaped areas of tissue necrosis (arrow II). Arrow III points to round shaped, post-mortem artefact.

Besides the leg injury, the autopsy revealed fractures of the fifth lumbar and first sacral vertebrae, a partially organized, thin layered subdural hemorrhage, and a necrotizing pneumonitis of the right lung. The heart weighed 275 grams.

The Medicolegal Problems: (1) What is the nature of the lesions in the brain? (2) What is their relationship to his death?

Discussion: (1) The brain showed grossly some inconspicuous alterations in the white matter (Figure 1). There were

flea bite-like dots, some of them black, some brown, and others grayish in color. The black and brown dots were suggestive of recent and older petechial hemorrhages. Furthermore, there were small irregularly shaped grayish areas indicative of recent softening or demyelination. Most of these alterations were located in the white matter of the dorsal portions of both cerebral hemispheres, in other words in the peripheral supply areas of anterior and middle cerebral arteries.

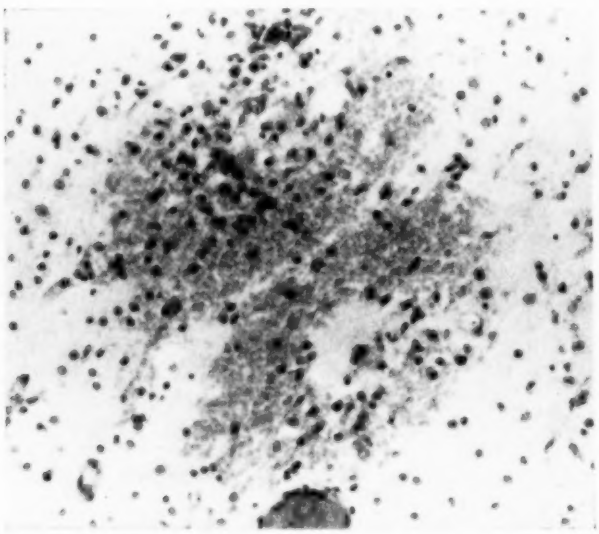

Fig. 2—Two ring hemorrhages showing signs of early organization. Nissl stain.

The histologic slides submitted for the seminar were taken from the paramedial portions of the hemispheres and stained with H & E. They showed several types of vascular lesions. The most obvious ones represented small softenings in the cortex and subcortical white matter exhibiting the histologic characteristics of the fully developed phase of resorption. (See Case 4.*) Therefore, the lesions may have been 10 or more days old. The second type of lesions consisted of a few, fairly recent ring hemorrhages (Figure 2) and the third type,

* Case 4 appeared in Journal of Forensic Sciences, Volume 2, Number 1, January 1957.

of pronounced, focal proliferation of the glia, occasionally ring-like, arranged around an almost acellular area with a capillary in its center (Figure 3). The acellular area was caused by plasma diapedesis and some necrosis of the tissues. In many of these foci of glial proliferation, there was pronounced phagocytosis with formation of gitter cells. In some of the lesions, hemosiderin was present, occasion-

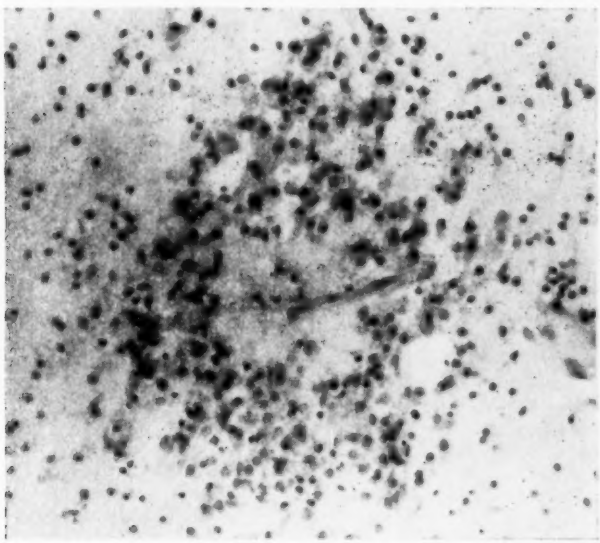

Fig. 3—Area of capillary plasma diapedesis without hemorrhage surrounded by marked glial proliferation. Nissl stain.

ally also arranged in a ring-like fashion (Figure 4). The fourth type of tissue alterations was characterized by a small, round or oval shaped area of perivascular edema or of demyelination with minor glial reaction and no hemorrhage or storage of iron (Figure 5). The vessels near or within the lesions were often dilated by a material not stained with H & E. A fat stain revealed that this material was fat and that fat embolism was the cause of the entire series of tissue alterations. There was evident obstruction of many precapillaries and capillaries by fat droplets without any damage to the

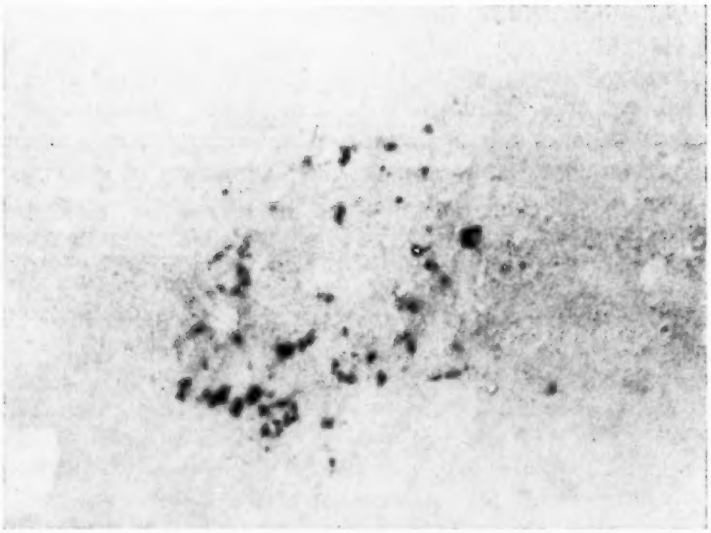

Fig. 4—Ring like arrangement of hemosiderin, the remainder of a former ring hemorrhage. Iron stain.

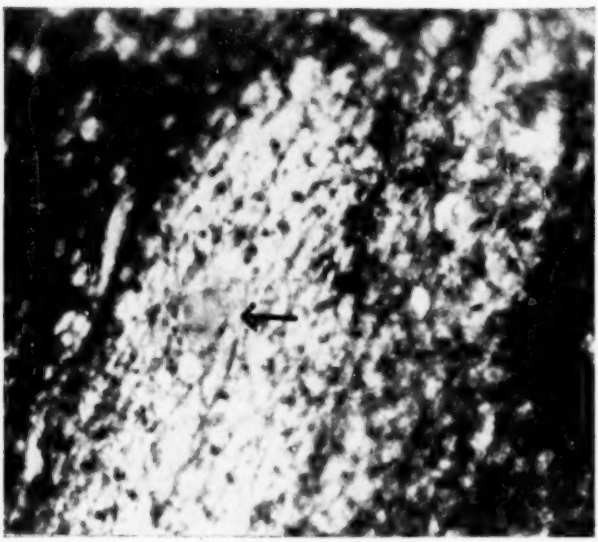

Fig. 5—Focal edema of white matter around a capillary obstructed by a fat embolus (arrow). **Fat stain.**

capillary wall or the adjacent tissue (Figure 6). It is of interest that there was not only a variation in the type of the lesions but also in the histologic age. The latter phenomenon suggests that repeated embolization must have taken place. Some emboli might have reached the brain even shortly before the patient died because the lungs still showed some fat emboli in their small vessels, although the accident was survived for 18 days.

Fig. 6—Fat emboli in cortical precapillary and capillary without tissue alterations. Fat stain.

It is well known that fat embolism occurs in various conditions and is most common in mechanical injuries. Most postmortem investigations report on incidence of pulmonary fat embolism in about 70 to 90% of traumatic deaths (Scully) (8). Kraus (9), in a recent review of cerebral fat embolism discussed 85 traumatic deaths of which 77.7% showed pulmonary embolism and cerebral involvement in 37.6% of the cases.

It is of interest to know how soon after the accident cerebral fat embolism may occur. Since the lungs may show fat

already in instantaneous traumatic deaths, some of the fat droplets may reach the brain within the first hour after the injury. Beginning focal necrosis of nerve cells due to fat embolism has been found as early as 2 hours after the accident by Krücke (10). With longer survival time, there may be a continuous increase in the number of emboli and within a few hours after the injury, cerebral fat embolism may become responsible for disturbance of consciousness or death of the patient. In the patient under consideration, the initial state of semiconsciousness must be mainly attributed to the cerebral fat embolism which also involved the brain stem. In general, clinical signs of cerebral involvement develop 2 to 6 days after the injury. One should not infer, however, that there was no cerebral embolization prior to the onset of these signs. It only signifies that the number of emboli and the resulting tissue damage, at first subclinical, finally reached a level noxious for the function of the brain. The present case illustrates that the tissue damage does not consist principally of punctate or ring hemorrhages. Many textbooks give the impression that these hemorrhages are common in fat embolism. The fact is that they are very rare. Among his 85 cases, Kraus found multiple white matter hemorrhages in only 2 of the 5 cases with moderately severe fat embolism. In our material, the incidence of the classical textbook picture is similarly low. Therefore, the absence of these hemorrhages should not be a reason to forego a staining for fat. Some of our cases of most severe fat embolism of the brain did not show, grossly, a single hemorrhage. The hemorrhages usually develop 2 to 3 days after the accident. Generally, they are preceded by a local plasma diapedesis distally from the occlusion. The erythrocytes frequently do not follow into the area occupied by the plasma. They leave the vessel proximal to it and penetrate the tissue surrounding it, thus forming a ring hemorrhage. Ring hemorrhages, as it is known, develop also in other, non-embolic conditions and are, therefore, not specific. Many hemorrhages in fat embolism are not of the ring type and may be very similar to small traumatic hemorrhages, especially in the corpus callosum. As striking as the hemorrhages are, the less obtrusive areas of tissue necrosis, especially in the gray matter, are perhaps of greater clinical significance. Not infrequently, the number of emboli found may

be far out of proportion to the number of focal tissue alterations and the tissue around many emboli may appear to be unharmed. The absence of morphologic damage, however, does not preclude that the cells are functionally incapacitated by a hypoxia of a degree not sufficiently severe to cause morphologic derangement. Such dysfunction of nerve cells may be just as significant for the development of clinical signs of cerebral involvement as are structural changes of the tissues. The emboli are usually distributed over all subdivisions of the brain and are more numerous in the gray than in the white portions because of the denser capillary network of the former. In some cases, however, the cortex and white matter of the border zones of the arterial supply areas (see Case 4), especially of the anterior and middle cerebral arteries, appear to be predominantly involved, as it was in the case presented.

(2) The cerebral fat embolism in the present case is sufficiently severe to be considered a contributory factor in the cause of death inasmuch as it furthered the development of the terminal pneumonia.

Case 10. Convulsive Disorders Due to Syphilis of the Nervous System

This 43-year-old white man was driving a truck when, according to his companion, he suddenly had an epileptic convulsion. The companion stopped the truck only after hitting three other cars. On admission to the hospital about a half hour later, the patient was still in convulsions. He showed no signs of mechanical injuries. A spinal tap was negative for blood. His temperature measured 108° F. rectally. The right pupil was larger than the left. The neck was slightly stiff. Otherwise, no neurologic symptoms were recognized. Chest and abdominal organs showed no pathologic signs. Blood pressure and X-ray could not be obtained because of the convulsions. Despite intensive anticonvulsant medication, the convulsions did not cease and the patient expired eight hours after admission. The brief pre-admission history mentioned that the patient had had no previous medical attention and no convulsions. A definite clinical diagnosis was not established. Four possible diagnoses were mentioned: (1) Brain tumor; (2) Epilepsy; (3) Brain abscess; (4) Ruptured berry aneurysm.

At autopsy an aortic valvulitis, rheumatic in character, and a very fresh, possibly embolic thrombosis of the right internal carotid artery were found. The brain showed a recent diffuse cloudiness of the arachnoid and granular ependymitis. There was a marked congestion of the extra-and intracerebral vessels, especially in the cortex. The histologic section for the seminar was taken from the left temporal lobe and stained with the Nissl method.

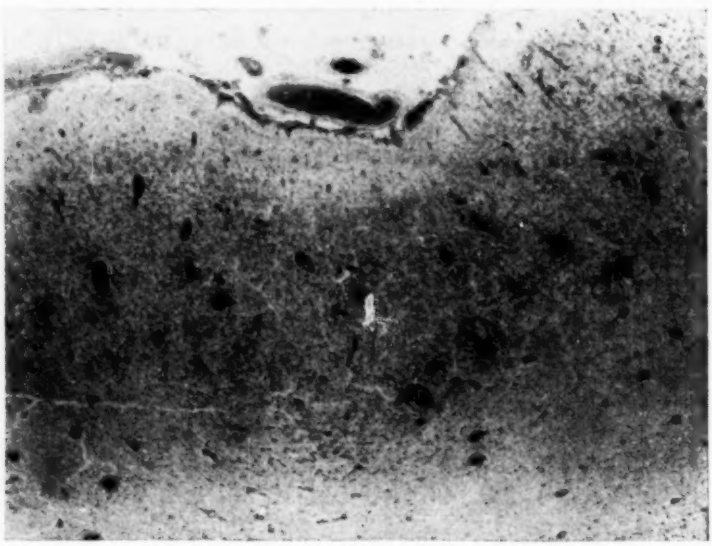

Fig. 1—Section from temporal lobe showing extensive inflammation limited to the cortex and mild leptomeningitis. Nissl stain.

The Medicolegal Problems: (1) What is the histologic diagnosis? (2) What is the relation between the auto accident and the death?

Discussion: (1) The slide showed a very marked encephalitis accompanied by a rather mild leptomeningitis (Figure 1). The intracerebral inflammation was almost entirely confined to the gray matter. The architectural pattern of the nerve cells was severely deranged. At higher power, the inflammatory cells in the cortex were plasma cells and lymphocytes

(Figure 2). They filled the perivascular spaces of small arteries, capillaries and veins. In many instances they infiltrated the tissue. There was severe loss of nerve cells and the remaining cells showed various stages of degeneration. The astrocytes and the microglia were proliferated, the latter tending to form rod cells. Some of them and some macrophages in the perivascular spaces showed a pigment which

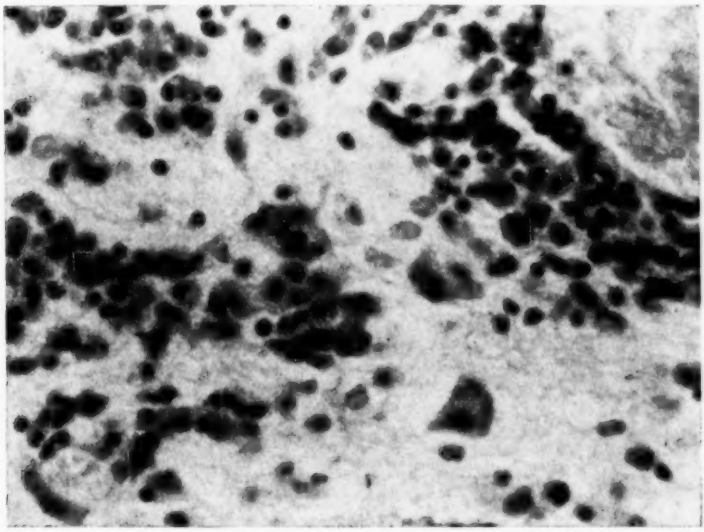

Fig. 2—Perivascular and tissue infiltration by plasma cells and lymphocytes. Degenerative change of nerve cells. Nissl stain.

proved to be iron (Figure 3). There was, however, no formation of glial nodules and virtually no neuronophagia. The infiltration of the leptomeninges consisted mainly of lymphocytes.

The type of inflammatory cells, the restriction of the inflammatory process to the gray matter of the brain, the loss of nerve cells, the type of glial response, and finally the presence of iron are characteristic of a syphilitic meningoencephalitis or general paresis. A positive staining for spirochetes would render the conclusive proof but in many instances, as in the present, no spirochetes can be found. Therefore, in making

the diagnosis one has to rely on the histologic characteristics of the disease. The distribution of the inflammatory process within the brain is also typical. The cortex of the frontal and temporal lobes is usually most markedly involved, that of the parietal lobes, especially of the anterior and posterior central convolutions, less severely, and that of the occipital lobes only slightly or not at all. Besides the cortex, the basal ganglia, the hypothalamus and the lower structures of the brain stem may show various degrees of the same type of inflammation.

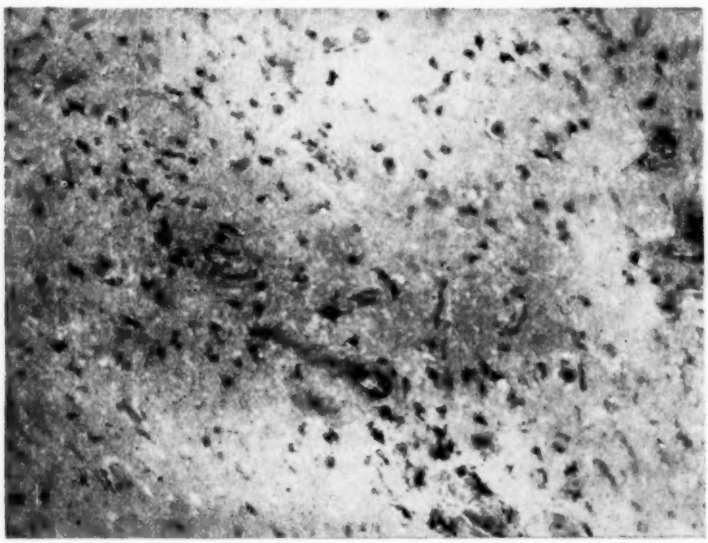

Fig. 3—Storage of iron in microglial and perivascular cells. Iron stain.

The white matter, however, is almost completely spared. Therefore, one may speak of polio-encephalitis. The deposition of iron in the areas of inflammation is most characteristic of the disease. It is supposedly related to a special metabolism in the paretic cortex. The chronic meningitis accounts for the often parchment-like thickening of the leptomeninges. Ependymitis of the granular or fusiform type is always present. It is, however, not specific for syphilis. The same is true for the formation of microglial rod cells. It should be mentioned that of all inflammatory diseases of the brain the African tryponosomiasis causes histologically the same alter-

ations as seen in general paresis including the storage of iron.

(2) In regard to question 2, the present case poses no problem. The auto accident had no relation to the death. The case was, nevertheless, presented because it demonstrates three facts which should always be taken in consideration if one is called to testify on the relationship of an injury to general paresis: 1. A person may already have severe meningoencephalitis but may appear to be in full health and satisfactorily pursue his daily work. 2. The first clinical manifestation of the disease may be a sudden paralytic attack which is not always an epileptic one and is often not fatal. 3. The accident may have been caused by a paralytic attack. If no one had witnessed that the epileptic attack precipitated the accident and the driver had survived the seizures, the present case might have become a very controversial one in court. It would surpass the scope of this presentation to discuss the relationship between trauma and general paresis in greater detail. This has been done by Solomon (11), Stern (12), and others.

Case 11. The Etiology of Acute Gastroenteritis

The deceased, a 14-year-old boy and his cousin who lived in the same home, became suddenly ill after eating pancakes. On admission to the hospital they were weak, clammy and exhibited severe diarrhea and vomiting. The cousin recovered gradually but showed dark albumen-containing urine and ECG abnormalities (in the T waves). The deceased exhibited persistent shock, diarrhea and vomiting and died 33 hours after admission. Post-mortem examination showed a flabby 380 gram heart, the liver was yellowish tan and fatty with an extraordinary mosaic composed of alternating tan to brown to red foci which, for the most part, seemed oriented with central tan areas surrounded by hemorrhagic rings in the mid zone of the lobule with yellowish tan tissue again in the periphery. The esophagus showed reddish discoloration surrounding the margins of elevated white plaques. The fundus of the stomach showed multiple superficial ulcerated areas with serpiginous outlines. The underlying muscle was edematous. Some of the ulcers were covered with black coagulated blood. The ileum showed similar lesions which were multiple

and confluent areas of edema and superficial necrosis covered by hemorrhage. (Figures 3, 4.) The cut renal surfaces showed marked accentuation by purplish red discoloration of the corticomedullary junctions with yellowish cortical tissue in which the dilated vascular network stood out prominently. The pelvic mucosa showed many petechiae. Microscopically, there was a focal necrotizing myocarditis with lymphocytic and granulocytic nuclear exudation but more striking was the vacuolation, loss of striation and actual necrosis of muscle fibers. The kidneys showed hyalin droplet degeneration of tubular cells.

The Medicolegal Problems: (1) What was the proper diagnosis? (2) What diagnostic procedures would you order immediately on hearing the patient's history? (3) Confronted with the clinical history of these patients, what advice would you give the clinician? (4) What steps would you advise the police to take in their investigation of the death?

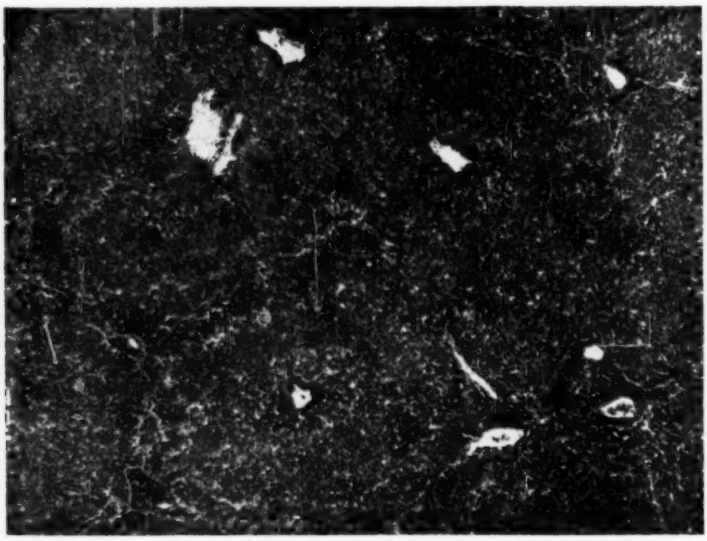

Fig. 1—Low magnification of the liver showing destruction of the architecture due to wide-spread midzonal necrosis with collapse of the lobule pattern.

Discussion: (1) The microscopic diagnoses on the liver and kidney were midzonal necrosis of the liver and necrotizing ileitis probably due to some toxic agent. Figure 1 shows the

severe disorganization of the liver at low magnification while Figure 2 shows, at high magnification, the complete loss of cord arrangement in the mid portion of the lobule with a sparse necrotic infiltrate and minimal evidence of regeneration. The combination of centrolobular or midzonal necrosis in the liver, myocardial degeneration with interstitial inflammatory response and superficial ulcers in the intestinal tract are the typical findings in acute arsenic poisoning. The pathologist is rarely confronted with such well-developed lesions as are present here since the more common type of arsenic poisoning is an insidious process caused by repeated smaller doses of arsenic. In these cases, the pathology may

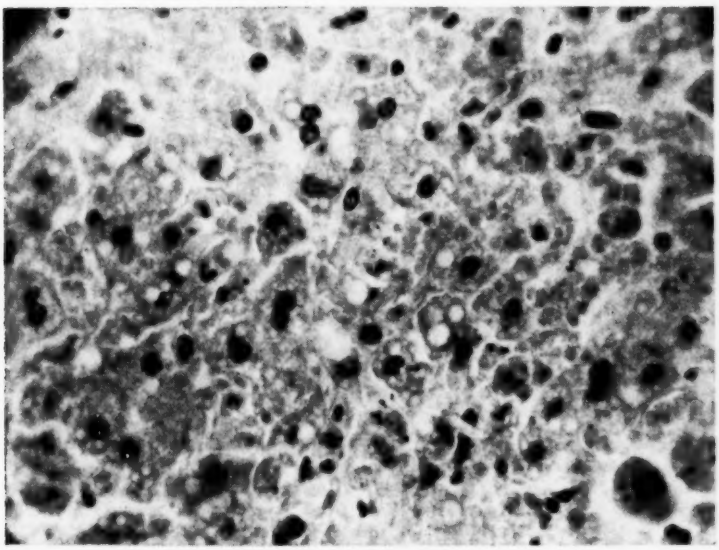

Fig. 2—High magnification of midzonal area of liver showing necrosis of cells with collapse of cord architecture and minimal evidence of regeneration.

be nonspecific or minimal and the toxicologic study may be the only solution of the case.

(2) The clinical history of multiple individuals in the family becoming acutely ill with diarrhea, vomiting and T wave abnormalities in the ECG should suggest arsenic poisoning immediately to the clinician who should order an analysis of

Fig. 3—Two sections of ileum showing essentially normal bowel above with thickened, partially necrotic bowel with ulceration of mucosa below.

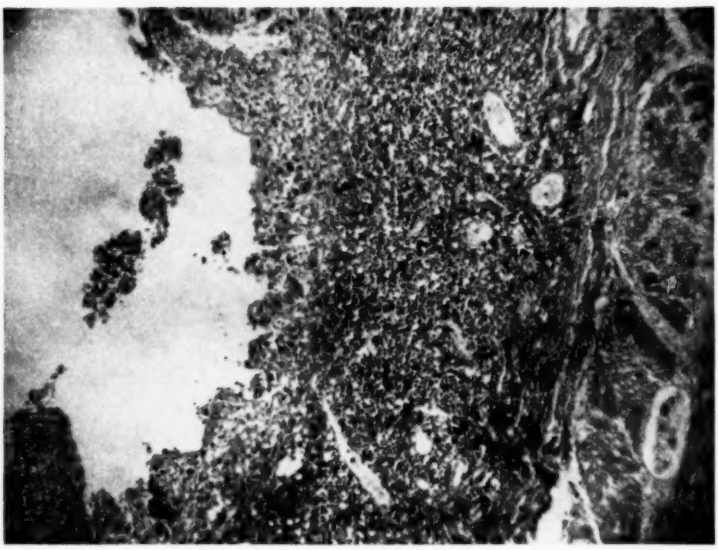

Fig. 4—High power magnification of ulcer seen in Figure 3. Note the extensive inflammatory reaction beneath the superficially necrotic mucosa.

the urine for arsenic. The Gutzeit test for arsenic, although not routinely employed in hospital practice is a simple one. The technique is described in most of the newer texts of Legal Medicine (13).

(3) On the basis of the clinical history of the patient, before death, the medical examiner advised the clinicians to treat with BAL, since qualitative tests of the urine for arsenic failed because no urine was obtainable and it seemed undesirable to withhold BAL for any long period while waiting for toxicologic study. The other possible diagnosis considered on the basis of the clinical history was fluoride poisoning, but since BAL is not contraindicated in this, the medical examiner felt justified in urging BAL therapy without unnecessary delay.

(4) The police were advised to search for possible sources for arsenic contamination of the food. It subsequently developed that arsenic had been added to the food, both the pancake mix and other flour within the house, by a jealous suitor of the dead boy's mother. He was convicted of the murder.

Case 12. Sudden Death Due to Coronary Artery Disease

This 64-year-old man was driving his car when he suddenly complained of being dizzy. The car swerved and a car coming in the opposite direction sideswiped the deceased's automobile. He lost control of it and ran into a pole. When the police arrived, he was unconscious, there was very little damage to the car. No one else was injured. There were no evident bruises on the body of the deceased. Post-mortem examination showed that the heart weighed 420 grams. The coronary arteries were perfused and cleared for examination using the technique of Durlacher, et al. (14). The left anterior descending vessel showed an area of brownish discoloration of the wall with narrowing of the lumen extending for a distance of 3 mm. It was located one and one-half inches from the origin of the vessel. The myocardium showed hemorrhagic discoloration in the anterior portion of the septum measuring one-half inch anteroposteriorly and one inch vertically in the septum. The remaining blood vessels showed remarkably little narrowing or sclerosis. There was no evi-

dence of injury. Figures 1 and 2 are sections of the coronary artery showing atheromatous plaque with hemorrhage into the plaque extending, in Figure 1, into the intima and fibrin and leukocytic thrombus engrafted on the irritated intima. Figure 3 shows the myocardial infarct with early diapedetic hemorrhage, loss of cross-striation and poor staining of muscle fibers but remarkably little leukocytic reaction.

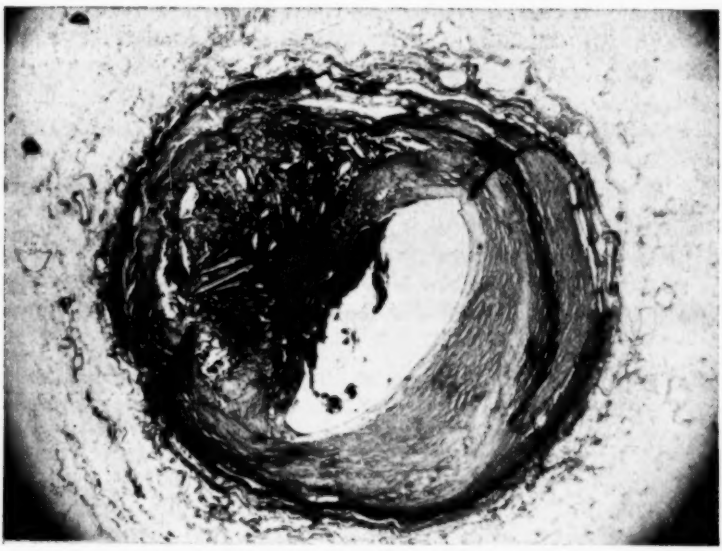

Fig. 1—Low magnification of coronary artery showing large intramural atheromatous plaque with fresh hemorrhage in the plaque extending up to the intima and fibrin thrombus superimposed on the irritated intima.

The Medicolegal Problems: (1) What is the nature of the coronary artery lesion? (2) What is the relation of the lesion to the accident? (3) What is the relation of the accident to the death? (4) How would you testify in a claim for double indemnity brought by the deceased's widow against an insurance company which has refused to pay the claim?

Discussion: (1) The coronary artery lesion is a fibrin and leukocytic thrombosis of the coronary artery apparently engrafted on an intramural hemorrhage into an atheromatous plaque. In our experience, the occurrence of hemorrhages

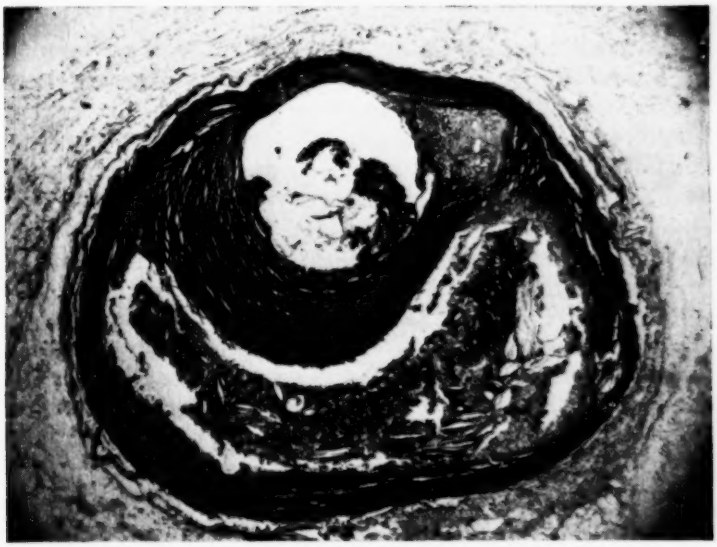

Fig. 2—Another section of coronary artery distal to Figure 1. Note that the fibrin and leukocytic thrombus nearly occludes the lumen.

Fig. 3—High magnification of myocardium in the area irrigated by the occluded coronary artery shown in Figure 2. Note the diapedetic hemorrhage and early necrotizing changes in the muscle fibers.

into atheromatous plaques in association with sudden death from coronary artery disease is very high, being present in well over 80% of all cases of this group. The myocardium showed infarction indicating, of course, that this lesion was of many hours duration despite the absence of any symptoms. This is a finding of considerable medicolegal importance and one which many clinicians fail to recognize.

(2) The relation of the lesion to the accident is direct in that there occurred sudden death from the heart disease and the dying man lost control of his car which then crashed into the other cars.

(3) We saw no evidence of any sort of injury in the body and it appears that the accident was post-mortal or at least in no way contributed to the death. The problem becomes extremely complicated where there is significant agonal or post-mortem injury since the casual investigator may fail to examine the heart adequately to demonstrate lesions of the type found in this patient. If fatal injuries are present, one cannot disprove that they caused the death rather than the heart disease and, since the jury ordinarily gives the benefit of doubt to the compensation plaintiff or the plaintiff against the insurance company, the negligence of the pathologist has little significance. In accident prevention and safety planning, however, the demonstration that heart disease sufficient to have caused the accident was present points the way to better safety precautions. Too, in many double indemnity type of policies, the importance of heart disease as the underlying cause of the accident is such that the pathologist who fails to study thoroughly the question and make the evidence available to the litigants, is derelict in his duty "to determine the facts and let the chips fall where they may."

(4) In testimony concerning double indemnity insurance in this case, we produced the record showing that the patient died of heart disease rather than injury.

Case 13. Secondary Brain Stem Lesions After Cerebral Trauma

This 51-year-old white male was an alcoholic for many years. A few days prior to admission to the hospital he felt weak and complained about twitching of muscles. While walk-

ing on the street he suffered from an epileptic attack and was taken to the hospital in an unconscious condition, still convulsing. There was a hematoma over the right occipitoparietal area. The pupils were round, regular and equal but reacted sluggishly to light. The left side of the face and the left arm were paralyzed. The right arm was weak. Knee and ankle jerks were absent. There were no pathologic reflexes in the lower extremities. Pain sensation was generally decreased. The blood pressure measured 180/100 and pulse rate was 100 per minute. Two days after admission, a craniotomy was done and revealed xanthochromic fluid over the left hemisphere and an old subdural hematoma over the right hemisphere. A linear fracture in the right lower temporal area was found. Throughout the operation the patient was in shock. During his long stay in the hospital, he never regained full consciousness. Numerous infections, especially of lung and urinary tract, were treated successfully. In spite of the best of care, the patient developed large decubiti and eventually died due to bronchopneumonia in the right lower lobe ninety-six days after admission.

The autopsy confirmed the diagnosis of bronchopneumonia. There were thin-layered, organized, subdural hemorrhages over both cerebral hemispheres. The arteries at the base of the brain showed arteriosclerosis without essential narrowing of their lumina. A few, small, old contusion foci were located in frontal and temporal lobes. There was an extensive, old, cortical softening in the supply area of the right middle cerebral artery and a smaller softening of the same type in the supply area of a temporal branch of the left middle cerebral artery. The thalami were reduced in size. The Ammon's horns appeared to be sclerotic. In the base of the upper and middle pons a lesion was found which can be seen in Figure 1.

The Medicolegal Problems: (1) What is the nature of this lesion? (2) What is the cause of the lesion? (3) What is the relationship of trauma to the lesion?

Discussion: (1) Grossly, the almost symmetrical lesion extended through the base of the upper and middle pons. It had the appearance of a scar but was rather soft without showing cyst formation. Its border lines were indistinct.

They were more clearly visible in a myelin sheath preparation (Figure 2) because of complete demyelination of the nerve

Fig. 1—Old partial softening in midline of pons extending symmetrically around dorsal aspects of both pyramidal tracts.

Fig. 2—Complete demyelination in area of the old partial softening shown in Figure 1. Myelin sheath stain.

fibers in the area of the lesion. The location of the lesion generally corresponded with the supply area of the paramedial branches of the basilar artery. Histologically, the tissue showed a loose texture and innumerable gitter cells trapped in a fibrous network (Figure 3) which consisted of astrocytes and surviving demyelinated nerve fibers. There were no signs of active phagocytosis or proliferation of glia, therefore, the lesion must have been older than a few weeks. It must have been an ischemic lesion because there was no storage of hemo-

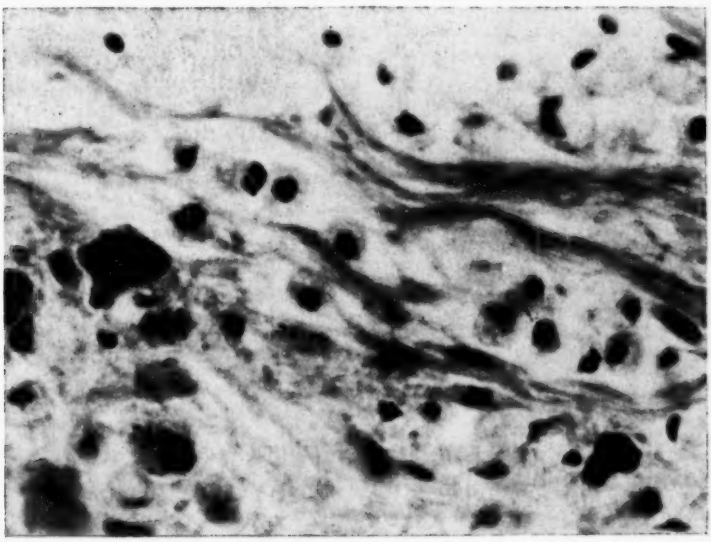

Fig. 3—Histologic detail of the softening showing gitter cells in network of tissue fibers and shrunken nerve cells. H & E stain.

siderin in the phagocytes. The nerve cells were reduced in number but many, usually shrunken, were still present within the lesion. Some small arteries showed degeneration of their muscle layer and a few arterioles intimal proliferation. There was no evidence of former thrombosis. The vascular alterations were limited to the lesion. In summary, the lesion constituted an old partial softening (see Supplement I).

(2) In view of the arteriosclerosis of the basilar artery and the vascular changes within the lesion, one might be inclined

to hold the alterations of the arteries responsible for the tissue damage. Considering all the other findings in the brain and the history of a subdural hematoma over the right cerebral hemisphere, another pathogenetic mechanism appears possible. It is a common experience that in cases of increased supratentorial pressure, the shifting of the brain stem, in a caudal direction, may result in hemorrhages predominantly in the base of the upper half of the pons. Figure 4 shows such a hemorrhage. Its shape and location is very similar to that of the lesion in the present case. Therefore, the question

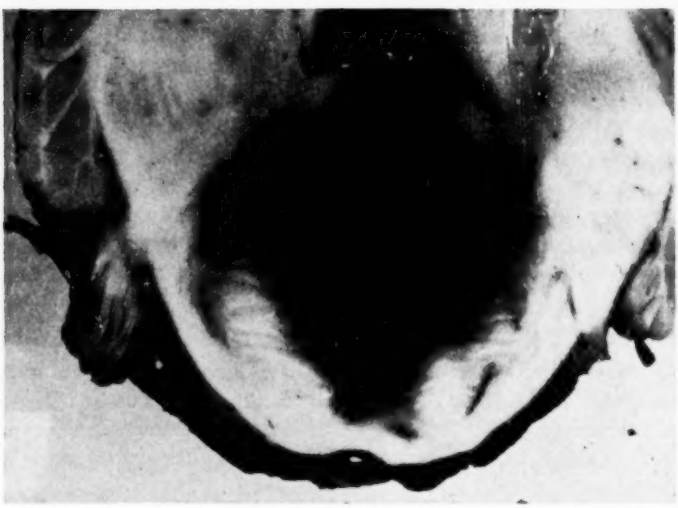

Fig. 4—Recent secondary pons hemorrhage in a case of head trauma showing a distribution pattern similar to that of the softening in Figures 1 and 2.

arises whether the latter, too, developed secondarily to the increased supratentorial pressure caused by the subdural hematoma prior to its operative removal.

In investigating a large number of cases of increased supratentorial pressure, mostly of traumatic origin, we found that the pons hemorrhages are usually preceded by an edema (Figure 5) which is often associated with necrobiotic changes of the cells (15). These cellular changes may be confined to an area roughly corresponding to that occupied by the partial softening in the present case. Therefore, it may be assumed

that this softening resulted from such edema and cellular necrosis. This assumption is the more justified as there were some additional lesions which were indicative of former increased supratentorial pressure, among them partial softenings in both hippocampal gyri and loss of nerve cells in both thalami (see Supplement II: Secondary lesions). Furthermore, the histologic age of the pons lesions was essentially the same as that of the cortical softening in the right hemisphere which obviously was responsible for the paralysis of the left side of the patient at the time of admission. Finally, identical alterations in the pons have been observed in similar cases without arteriosclerosis. The pons lesion, therefore, may be considered an ischemic equivalent of the more common secondary pons hemorrhages. The arteriosclerosis and the

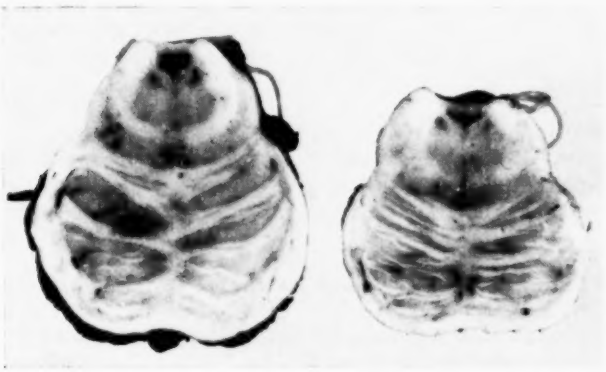

Fig. 5—Marked non-hemorrhagic edema in base of pons secondary to a traumatic subdural hematoma (left) as compared with a normal pons.

hypoxia during the prolonged epileptic attack and postoperative shock may have contributed to its development.

(3) The case had no actual medicolegal implications and was presented in order to draw attention to the fact that, in many cases of increased supratentorial pressure, whether due to trauma or other cause, edema and cellular necrobiosis, without the more conspicuous hemorrhages may develop in the pons as secondary alterations. The same can be observed in the midbrain. These non-hemorrhagic alterations may just as well interfere with the function of vital cell groups and

pathways in midbrain and upper pons as so often do the hemorrhages but may be readily overlooked and the ultimate cause of death may, therefore, be missed. With modern techniques of emergency treatment tissue damage of this type may be survived. If extensive, as it was in the present case, it will be one of the factors responsible for the permanent abnormal state of consciousness of the patient. In this case, the subdural hemorrhages causing the original symptomatology were undoubtedly due to trauma—a fall while intoxicated.

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Book Reviews

FORENSIC MEDICINE, by Keith Simpson, M.D., Reader in Forensic Medicine to the University of London. E. Arnold & Co., London and Williams & Wilkins Co., Baltimore, 1952. 2nd Edition. 344 pages. $5.00.

In presenting this short text on forensic medicine, the author approaches the analysis of this problem from the point of view of an English school. This text is essentially a practical guide for the doctor and lawyer in the field of forensic medicine. The subject of forensic medicine is a very fascinating one in that the autopsy findings as well as ancillary scientific studies, aid in the construction of the factors leading to unexpected death. All aspects of medicine and allied sciences are brought into play in order to render assistance to the law in the analysis of the truth in the subject under investigation.

The text is divided into two sections: One dealing with forensic medicine, the second with toxicology. In the first section there are seventeen chapters beginning with, "What to Do With a Dead Body," to "Criminal Responsibility and Mental Disease and Crime." In the chapter on drowning, the author refers to the investigation made in the United States in establishing the relationship of salt water and fresh water in the cardiac chambers and the relative importance of the chloride content of the blood, thus indicating the author's interest in forensic medicine literature in countries outside England. In the chapter on Natural Disease and Trauma, the author states, "The only common organic cause of instantaneous death is coronary occlusion by atheroma, sometimes complicated by thrombosis or, if delayed for a few days (whilst infarction is developing), further complicated by rupture of the heart through the infarcted area." But the subject of sudden unexpected death also includes discussion on rupture of the aorta as a common vascular cause of sudden,

though hardly instantaneous, death. However, "neither cerebral hemorrhage nor cerebral thrombosis are likely to cause really sudden death. Collapse may be sudden, but death is more likely to be delayed some hours whilst the ultimate consequences of the extravasation of blood become developed: they take time. This is true also of the ruptures of 'congenital' cerebral aneurysms which become established, as life proceeds at the site of the developmental weakness in the elastic coat at the stem of branches of the cerebral arteries."

In relationship of disease with work, trauma, and crime, there is stated that there are some pathological conditions, like coronary occlusion, the relationship of which to exertion or work stress is so obvious that arguments seldom occur over compensation. "Anything which demands a quickening of the circulation and increases the strain on the heart may be regarded as contributory to heart failure from coronary occlusion." Any type of exertion like climbing ladders, lifting furniture, etc., may be sufficient for the heart muscle and it may be dangerously near-fatal ischemia. This may be readily understood by the Compensation Boards in England, and in some of the local areas in this country, and this concept is accepted without argument. Concerning the question of trauma and tumors, the author is of the opinion that "though it would not be reasonable to associate the trauma with the growth, it is not a certainty. It is a strong probability, and such are the final assessments of most cases of the kind."

The second half of the book, which is devoted to toxicology, stresses more the laws regulating the sale of poison, and the clinical variations in association with different poisons ingested. The technique for the determination of poison is not stressed as strongly as in particular books dealing with the subject of toxicology.

This book is based on the author's experience in forensic medicine and further proves on reading, to be equally engaging in content. The format is good, the reproductions are clear. The author is an established authority in forensic medicine and enjoys an excellent reputation in this field. This book is recommended to all physicians and medical students interested in this very fascinating subject of forensic medicine.

FUNDAMENTALS OF CRIMINAL INVESTIGATION, by Charles E. O'Hara, Lecturer in Police Science, Western Reserve University, on leave from Detective Division, Police Department, New York City. Charles C. Thomas, Publisher, Springfield, Illinois, 1956, 722 pages illustrated. $8.50.

Despite an imposing array of subjects, as indicated in the chapter headings, this book cannot be recommended as a text for the student new in the field of investigation. Misinformation and errors appear far too frequently, particularly when the author becomes overenthusiastic in explaining technical details. Occasional poor sentence structure and use of uncommon words make reading difficult in places.

The concept of the three "I's" (Information, Interrogation and Instrumentation) as tools of investigation is not unsound. However, on close inspection it will be observed that the latter two are merely special methods of obtaining information.

More serious and potentially dangerous is the idea that the investigator may become *superior* to the rules. In the preface the author, to excuse himself for setting forth some of the material in the form of rules, states, "The learner, however, must be guided by rules until he knows enough about investigation to be superior to the rules." This is poor advice for any investigator and even worse for the student. Whenever an investigator, or anyone else connected with investigative or law enforcement work, feels that he is superior to the rules he will tend to lose his objectivity and may even become an advocate of one side of the investigation. When this happens not only is the investigator criticised but the entire profession is judged accordingly. It is true that the investigator may, through experience, become so familiar with the rules and procedures that they seem almost automatic; but even here he is not ignoring or becoming superior to the rules.

Perhaps the greatest shortcoming of this book as a text is the complete lack of references and a bibliography. Statistics are set out and statements made which should be based on statistics but no mention is made of the source of the

figures. Statistical patterns as well as methods of operation vary from locality to locality and the student reader might be misled if he does not realize that the figures or statements may apply to a particular locality and not be true in others.

When the author sticks to the fundamentals of investigation the material is good to excellent. Part III "Obtaining Information" which covers Interviews, Interrogations, Informants, Tracing and Sources of Information, Missing Persons, etc., and part V "The Investigator in Court," fall in this group.

The work suffers, however, when the author loses sight of his primary goal and attempts to explain techniques of the medical examiner, chemist, psychologist, physicist, criminalist, etc. Part IV "Specific Offenses," part VI "Identification and Reproduction," and part VII "Specialized-Scientific-Methods" are included here. Misinformation and errors in technical details cannot be condoned in a work of this type. Even the most experienced investigator should not attempt to cover so many subjects in such detail without the assistance and counsel of those individuals most proficient in the various fields to which the investigator must turn for information.

Part I "General," part II "Initial Steps," and part VIII "Investigative Operations" are basically sound but difficult to read in some places.

The illustrations are of good quality but two titles seem to be interchanged and two appear to be improperly oriented on the page. (Upside down and sideways.)

It is unfortunate that this book falls short of its avowed purpose, since there are not too many texts to which the beginner in investigation may turn. We can hope that an improved edition may be forthcoming which will help remedy the situation.